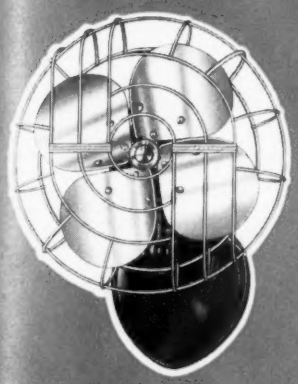
DECEMBER, 1939

ELECTRICAL SOUTH



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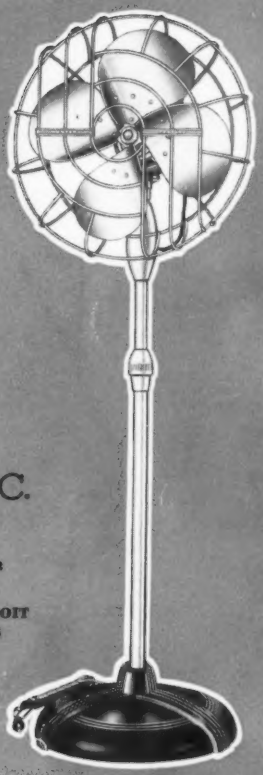

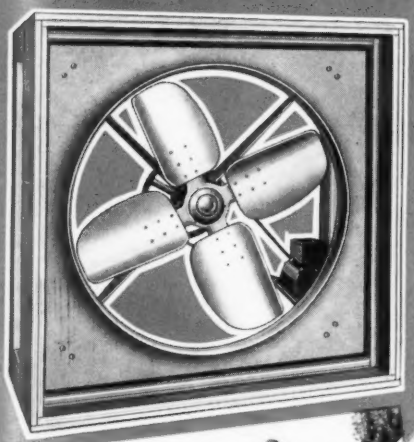

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CEMBER, 1939
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DECEMBER
1939

Volume 19 No. 12

ELECTRICAL SOUTH

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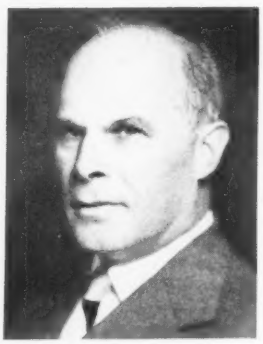
For Mutual Understanding and Cooperation in the Industry

These discussions were presented by leaders of the industry at the 4th Annual Conference of the International Association of Electrical Leagues.

Utility . .



By C. W. Kellogg
President
Edison Electric Institute

IF a detached stranger undertook to analyze the electric business of our country, through which some 28,000,000 customers receive electric service, I dare say the thing that would amaze him most would be the number of units engaged in the process and the extent to which the work is subdivided. There are, to begin with, the 3,501 electric utility enterprises, which manufacture, distribute and sell electric energy.

They sell a formless, odorless, invisible something which is of value not for what it is but only for what it does. It can do the things desired only through various forms of electrical apparatus and these are manufactured by approximately 1,500 companies and retailed through about 20,000 dealers, all of whom, electrical manufacturers and dealers, department stores, furniture stores and others, are in no way connected with the utility companies that make the energy they utilize, but are interested in the use of electricity.

The dependability and economy of electric service depends upon the steam, hydro and electrical generating equipment and their myriad controls, which in turn are made by another 300 or more manufacturing companies—all of these again independent of the utility companies.

While the utility companies have complicated networks of transmission and distribution lines to carry the energy to the 28,000,000 customers they serve, yet each of these individual customers in turn has its own distribution system in home, factory or office building, and in the installation of these private distribution systems close to 10,000 electrical contractors are engaged. These also are entirely independent of the utility companies.

Finally, the electric consuming public, through its governmental authorities and insurance companies, is vitally interested in having this unseen juice handled safely with respect to life and property and upon this requirement about 5,000 inspectors are constantly busy with the checking up of the quality of the electric wiring installations going in all over this land. This group is entirely independent of the utility companies.

The man who coined the phrase "Power Trust" to refer to the electric business could hardly have realized the extent of the division and subdivision of the activities engaged in electric service, which I have so briefly described; nor realized that the final result—the useful work, economically and dependably performed, for the 28 million users,—rests in the last analysis on satisfactory performance by all of these related interests working together.

There are various consequences arising from this great subdivision of function and it is these that I propose briefly to consider.

In the first place the spirit of keen competition pervades the entire fabric, except of course in the case of the inspectors. The manufacturers of generating and trans-

(*Continued on page* 44)

Manufacturer . .

By M. Porosky
Vice President, National Electrical Manufacturers' Association

I AM delighted at the way men in the various branches of our industry are coming to realize the fact that maybe the other fellow is not always wrong. We all have knotty problems to solve. In greater or lesser measure, some of them affect our most vital interests, and it is only human nature to feel that the fellow who opposes us is doing it out of pure malice or selfishness. But, as we together solve first one and then another of our problems, we begin to feel a glow of pleasure at getting out of bad situations, with everyone concerned being made perfectly happy; and we are encouraged to try again and again until we are even willing to try to bridge those differences of opinion that have defied solution for so long a time, that they have become practically taboo subjects . . .

We manufacturers are the same kind of people as are members of the utility, wholesaler, contractor, dealer and other branches of the industry but we, as do they, on occasion, cannot understand why oth-

ers even question our contentions. We have learned that by selecting and consulting experts, representing varying interests and viewpoints, and sitting around a table to explore all angles of the situation, we not only realize that we do not possess all the wisdom and knowledge of the universe, but we find the other fellow too has thought deeply and seriously about the bone of contention, and so illuminates it that we, perforce, in all fairness, accept conclusions that would have been wholly unacceptable at the outset. I don't mean to intimate that all is smooth sailing, even yet. You would not believe it anyhow, but, despite many subjects still fiercely debated among ourselves and with others, progress is definite and recognizable and the accomplishment of agreement is speeded up with increasing understanding.

Having enjoyed working with and observing the operation of what we call joint industry committees, I can attest that our industry which has four major branches is rapidly accepting the fact that they sum up to one industry, with somewhat different functions, the combination of which spells public service, and is where we sometimes get off the track. If we all keep in mind that while we, as individuals, may be quite proud of ourselves and our particular sector of the industry, we can only survive if we together serve the public faithfully, and that we can do that only by combining forces and handling our share of the job in the proper sequence with others and with complete honesty of purpose . . .

No national program, no matter how good, can succeed without your loyal and active participation. I believe it was George Whitwell, a former chairman of the Modern Kitchen Bureau, who said that "the success of a national program is the sum total of the successes of local activities."

It must hearten you, as it does those of us on the outside, to note that the local cooperative movement is growing. The fact that representative local groups are needed to undertake industry programs and that these programs, in the national sense, are better designed and more widely sponsored thereby, indicates that the growth will continue. Naturally, it will rise and fall as do most other

(*Continued on page* 44)

Wholesaler . .

By J. G. Johannesen
Chairman, Executive Committee, National Electrical Wholesalers' Association

THE history of the Electrical Leagues and their consistent activity tell a convincing story. The leagues have been and are an important factor in the success of any cooperative efforts of the four major branches of the industry.

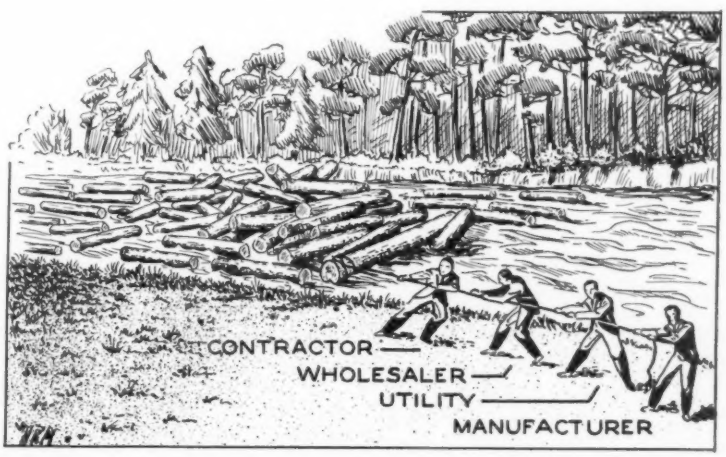
I speak authoritatively for the wholesalers' organization, when I say that we urge our members to see that individuals in their companies take an active part in local league work and we flatter ourselves that, in turn, there must be a high confidence placed in us by the local leagues, because several leagues have elected wholesalers to lead them.

Now, as to the wholesaler's place in the industry picture. A rather unique position is held and a dual function performed by the wholesaler. He is at once the customer of the manufacturer and has, as his principal customers, the utilities, contractors and dealers.

He is the middleman in every sense of the word, and that, too, is his position in any cooperative effort being made by the industry. Let's take the Modern Kitchen Bureau, as an example. The manufacturers share the expense of the cooperative national advertising. They prepare special advertising matter on their own products to tie-in with the material put out by the Modern Kitchen Bureau. All this is to help the dealer and the utility make more sales, which, in turn, mean more business for the manufacturer and the wholesaler.

After the manufacturer and the Bureau have planned the campaign, the groundwork of putting the plan into action is generally done by the field men from the Bureau. These men contact the leagues, the utilities and the distributors. However, they have tremendous territories to cover and cannot stay to do the follow-up work.

The utilities for the most part are set up to carry on directly, through the league or the Bureau, but, in most cases, the independent dealer needs specific help and that's where the wholesaler should function. He should be the clearing house between the manufacturer and the dealer. He doesn't have to think up the idea, or pay for the national advertising, but what he should be doing is to see that the plans are carried through and that advertising material reaches the dealer at the proper time and is put to the proper use . . .



Mutual understanding and cooperation displace the "key log" obstacles that impede the progress and development of industry.

No matter how thoroughly we, as one branch of the industry, do our part and, no matter how thoroughly the other three branches do their parts, unless there is a central meeting place, where representatives of the four branches can get together, any plan is apt to fall by the wayside.

That the electrical leagues are performing this function is obvious. That they continue to exist and thrive and expand, even through depressions, is conclusive of their importance to the industry.

Maintaining and increasing sales, however, is not the only problem which confronts the various branches of the industry. Technical difficulties, management problems, legislative actions, personnel and public relations are just a few of the other daily considerations. Usually, these things cannot be handled well all by one's self. Cooperative studies, information and advice must be available. Locally, the electrical league is an excellent and dependable source of such aid . . .

Contractor . .

By Earl N. Peak
Past President, National Electrical Contractors' Association

THE problems of the electrical contractor could in part be corrected, and in most cases solved, by mutual understanding and cooperation within the contractor's own group, as well as with the other groups of the electrical industry.

To my mind, there are several things which are important factors in making any program achieve success, and there are factors which can easily cause the downfall of a program. One very destructive factor is selfishness; another is greed; still another is fear. The lack of consideration for the position of others contributes to the failure of many worthwhile movements.

A selfish person is an obstructionist. His desire for personal gain causes him to oppose important programs. Such a man is capable of delaying a progressive movement if he so much as thinks someone else may receive credit and applause which he feels may be due himself. If such a person cannot be the whole show, he is "agin" it.

The narrowness of vision which causes these people to stand in the way of industry progress makes it impossible for them to see that even though they do not receive apparent benefit themselves, yet anything that helps the industry will in time help them.

The bogeyman of fear makes some contractors hesitate to do what should be done for the good of the industry. Too much hesitation, too much standing aside, too much so-called diplomacy—all of these things have resulted in great harm and all of these are caused by fear . . .

Failure to recognize the position of others on various subjects has caused the defeat of programs of real merit, and this, too, has seriously retarded industry development. It brings about dissension on points which could be adjusted if the parties concerned would be reasonably minded and willing to consider the matter fully.

All of these things are detrimental, not only to the industry as a whole, but to the individuals most closely affected as well, and generally it is those who are not in on the inside of the deal who pay the greatest portion of the cost.

Where the industry at large is too likely to suffer is in the advantage other industries take while these internal strifes are going on. Other industries, while the electrical industry is wasting time in unproductive bickerings, are improving the shining moments by gaining the lion's share of the public's spending dollars.

The time has come when our industry programs should not be allowed to be retarded by certain individuals or by groups of one branch of the industry which are aggrieved because they may feel they have not received the credit for the program, or because they cannot see where they will receive immediate, direct benefits. And as I have already said, many worth-while business plans cannot be put into operation because of fear that they might offend some individual, company or branch of the industry . . .

The electrical contractor is not a bad sort of fellow. Perhaps there have been times when he has felt he has been treated unfairly, and in retaliation has acted in a manner not to be recommended.

Contractors' Problems

Sometimes, the source of the trouble causing friction in the industry has arisen in a place far removed from the contracting field, yet by the time it reached the contracting group has broken out of bounds there.

Electrical contractors appreciate receiving consideration from manufacturers and wholesalers in their wholesale policies, or should I say, on their *sales* policies. However—present day policies are such that I question if we can call them anything other than customer prices, for many customers' or consumers' prices are identical with the quotations made the established electrical contractor. Other quotations made on large installations are made in such a manner that to bid separately on items is an impossibility. Preferential discounts to a favored few has caused much concern in some localities.

Utilities' attacks on the high cost of wiring as a retarding factor on the sale of current has annoyed contractors, and in certain places, a program of retaliation has been advocated.

Such conditions start a vicious circle, and no one can say where it will end.

During the past few years, however, there has been a program of industry cooperation which has been helpful in many cities. It could have accomplished more, had there been sufficient funds to follow through on a national scale. I refer to the Electrical Industry Promotion Committee. The principles advocated by this committee are just what this discussion is about.

Many communities have taken advantage of the efforts of the committee and through the cooperation of the electric leagues, have been able to carry on some fine work over the entire country.

Training and Discipline

These are the essential elements in this successful sales organization's program.

CHARACTERIZED as a scientific approach to the business of appliance merchandising, a plan now in effect in the specialty appliance department of Max Barnett Furniture Co., Inc., New Orleans, features carefully supervised training for salesmen and a rigid schedule covering every phase of the salesmen's operations.

The plan went into effect when Alfred H. Uhalt took charge early in 1939. It is based on principles of appliance merchandising learned through many active years in the field and in the merchandising division of one of the large appliance manufacturers.

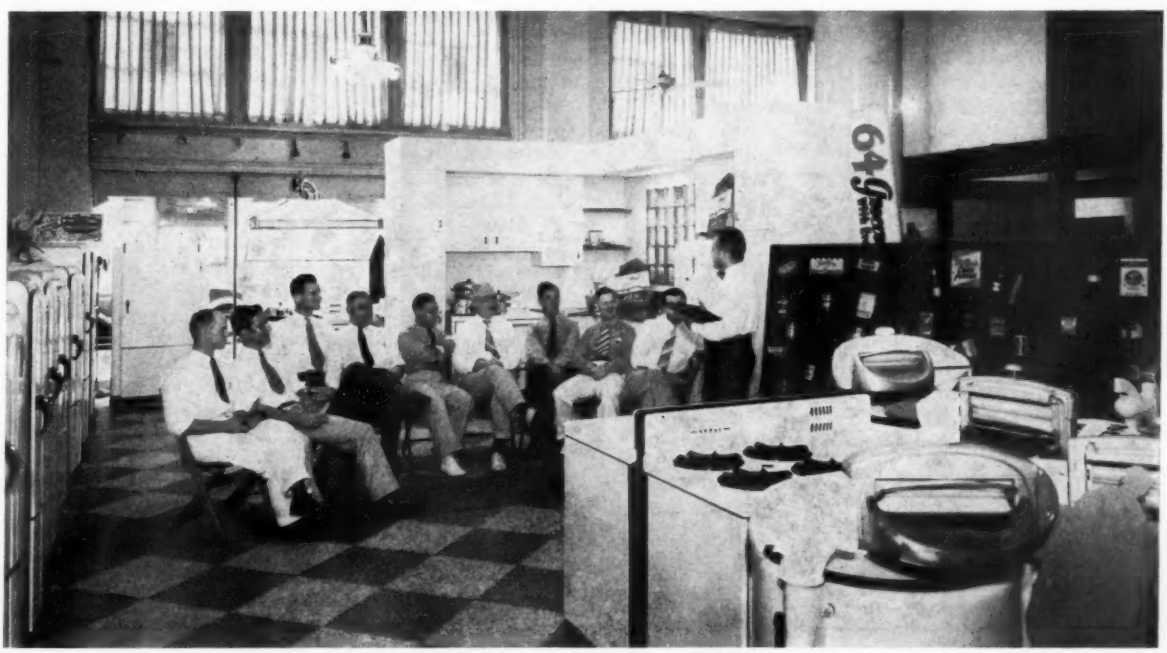
This sales plan (with which salesmen must be thoroughly familiar) is built around a central theme: that most wanted in the home of today is a "beautiful, automatic, push-button type kitchen" —one that will save both money and labor for its owner, the use-value being greatly enhanced by its beautiful appointments.

This central theme calls for unusual training on the part of salesmen—training in architectural layout and in an understanding of the numerous functions which originate in the kitchen. Such training fits the modern appliance salesman with an authoritative background which can be had in no other way, Mr. Uhalt says.

Individual appliance items which go to make up a modern automatic kitchen are vigorously and intensively merchandised under the plan. The step-by-step method of kitchen ownership is applied.

Salesmen must be prepared to study the precise and intimate details of administering the work and the money spent in running a home, be it mansion or cottage. Such details include: (a) food buying at a saving; (b) food preservation—refrigeration; (c) food and utensil storing; (d) food preparation and cooking; (e) architectural arrangement of equipment, cabinets, appliances and work surfaces; (f) proper illumination and ventilation of all work surfaces, appliances and breakfast nooks; (g) training on kinds of water, soaps, chemical spotters, etc.

With such training, a man becomes qualified to work with the better architects, builders and owners—not merely to sell appliances, but to help them buy the right equipment or appliances for



Intensive training of salesmen and a rigid schedule covering practically every phase of the salesmen's operations are features of the sales program established by Alfred H. Uhalt, manager of the specialty appliance department of the Max Barnett Furniture Co., of New Orleans. Here, Mr. Uhalt addresses a group of his senior salesmen.

This attractive model kitchen on the first floor of the Barnett Company store is an important sales aid.

a given requirement.

A maxim that Mr. Uhalt stresses to his men is, "People buy the things they want—people price the things they need. And the salesman's job is to convince them of the want, that they live but once, so why not live better and happier?"

Having given the salesman a definition of his job, Mr. Uhalt next gets down to the details of the operation as a whole, outlining company policies as follows:

(1) A definite budget anticipates and provides a definite amount of money which is spent on schedule each month in advertising, promotional and sales activities before the supporting sales volume is realized. Therefore, the budget likewise anticipates definite sales for the period involved. Such quotas must be made; excuse is not acceptable because the percentage allocated to advertising promotion and sales expense for promoting such quotas has been spent. To assure that monthly sales quotas are realized, weekly quotas are set.

(2) Salesmen are divided into two groups—senior and junior.

(3) Senior salesmen "own" territories and are responsible for the weekly quotas in such territories.

(4) Junior salesmen are responsible to their senior salesmen and are compensated by them.

(5) A senior salesman's resignation is in order when he does not realize his monthly quota for four consecutive weeks, after his first month of employment.

(6) Senior salesmen set their weekly quotas jointly with the department manager, based on number of juniors they are working and prospects available.

(7) Primary sources of new business are: (a) meeting a definite number of new people every day; (b) using the user plan; and (c) store leads, including store records.

(8) One evening selling appointment must be completed five days per week unless a man's sales record is better than 150% of his quota for the year to date.

(9) Salesman's selling attitude should parallel the company's advertising policy by being intensive and hard-hitting and of a character that is not misleading in fact or by inference.

(10) The salesman must use good business judgment in applying the house's credit accommodations.

(11) Double quota credit is awarded on all refrigeration and kitchen contracts of less than twenty-four months maturity.

(12) Two per cent of net commission is credited to salesman's reserve account to act as a shock absorber against charge-backs until his reserve account reaches $50 for each $5000 in sales volume. This is a protection and a savings account payable one year from the date of each $5000 or fraction.

(13) Saturday is pay day on all deliveries through Friday.

(14) Under no circumstance is a salesman allowed to make promises on merchandise delivery time or date.

(15) Complaints take precedence over sales.

(16) Sales "tools" that salesmen will require from time to time are charged to their account on a 50/50 basis and are not returnable.

(17) Direct mailings will be made for salesmen on well-qualified prospects—provided they follow such mailings by personal contact immediately.

Some other maxims of Mr. Uhalt's are as follows: "What is right is more important than who is right," "A friendship founded on business is better than a business founded on friendship," "Regardless of circumstances, do that which is right," and "Anything which might alienate one person or a group from another is not good business."

Interesting Sales Plan

The following fifteen rules serve further to outline the salesmen's work:

(1) Territories are "owned" exclusively by senior salesmen and all deliveries into it from any source whatsoever go to the "quota credit" of that territory, plus 30% of the net commission in money.

(2) Seventy per cent net commission goes to the closing salesman, with the exception of laundry equipment and ranges, in which case the salesman receives 30% of the net commission, the remaining 40% going to the reserve account for general promotional purposes.

(3) "Drop-ins" are referred to the man on the floor unless the "drop-in" asks for and is served by another salesman.

(4) Registered prospects have exclusive protection for ten days.

(5) Registered prospects closed by the floor salesman entitle him to only 30% of the net commission. Forty per cent of the net commission goes to the salesman who registered the prospect, and the remaining 30% to the salesman owning the territory into which appliance is delivered.

(6) All leads and prospects are referred to the territory and the salesman owning it. Mr. Uhalt's judgment rules on unassigned territories. (*Continued on page* 43)

How to Close Water Heater Sales

SUCCESSFUL technique in closing electric water heater sales is disclosed in the Modern Kitchen Bureau's recent letter writing contest. Two of the winning letters are reproduced here.

Operating Cost Analysis An Important Factor

By A. A. Anderson

THE best prospects for electric water heaters are those customers who have installed electric ranges or other major appliances and whose monthly consumption is such that the additional energy for electric water heating will be in the lower brackets of the rate. Customers that have other major appliances are "electrically minded" and are most easily sold.

Having checked through the list of electric range users, I send direct mail folders on electric water heating to a few range customers each week. The following week, after this adequate advertising has been mailed, a personal call is made on these customers. Before a call is made, the prospect's account is checked to see what the average monthly kilowatt-hour consumption has been. This information, when studied before contacting the prospect, furnishes the basis for substantial figures on the cost of operation.

In approaching the customer, he is informed of the fact that in going over our accounts we find that he does not now enjoy the advantages of automatic hot water service and that according to our records of the past few months this service could be furnished at a very reasonable cost to him electrically. This lends a direct approach and guides the sales talk along a personal line.

The many advantages of a constant supply of hot water are stressed. The prospect must be sold first upon the value of this service. In most cases he admits this value and will express a desire for such service. However, I am always sure that this need is actually appreciated and admitted before going on with any other phase of sales presentation. After he has agreed on the real value of hot water service, and has expressed a desire for it, the most natural question that arises is: how much will it cost to install and operate?

The prospect is informed of the analysis made of his account, and after determining how many people compose his family, and what additional uses he may have for hot water, an estimate is made of the number of kilowatt-hours of energy that will be required to supply his needs. The rate on which additional kilowatt-hour use will be based is explained and operating costs are thoroughly discussed. Many people are under the impression that electric water heaters are downright expensive to operate. It is therefore necessary that they be sold on the fact that hot water for their needs will cost them an amount which is commensurate with the service they will enjoy. The customer ordinarily is not impressed by averages when informed by his neighbor of his bills. Only the higher costs are what he remembers. He wants to know what it will cost him.

The size and price of heater to be installed is not a deciding factor in a sale. If the customer is sold on the value of hot water, on the amount this service will cost, and on the idea that this service is worth the cost, it is easy to recommend the size and price of heater.

The manufacturer, size, and proper installation of equipment may be an important factor in the operation or service of the heater and the customer is shown so. Then, in most cases, the sale of the particular heater recommended is easily consumated.

I never sell electric water heaters but sell constant electric hot water service.

WHAT!
YOU'RE AS CLEAN, SAFE, CAREFREE AS Electric LIGHT?
THAT'S WHAT A MILLION USERS SAY ABOUT Electric WATER HEATING
JUST INSTALL ME AND FORGET ME – I'LL GIVE YOU INSTANT HOT WATER ALWAYS AT THE TURN OF A FAUCET!

A typical advertising mat available from the Modern Kitchen Bureau. It stresses "instant hot water" and the characteristics of cleaniness and safety.

Five-Step Program is Followed in Every Sale

By C. J. Sauriol

THE sale of a water heater or any electrical unit is not made in a minute or by chance, but requires careful building-up and a fine power of discrimination. My program consists of five definite distinct points which I shall describe in detail.

The first step is the securing of prospects. This may be done in various ways—through satisfied owners, real estate dealers, plumbers, wiremen, general building contractors, and most important, from my local sales floor and the office personnel. The proper handling of these people who are prospects is most important, too, in order to insure future tips from the same sources.

By studying the background of the potential customer, I acquaint myself with his ability to own and operate an electric water heater. This is done to prevent effort being spent on someone who falls into the category of a "suspect" rather than a "prospect." Naturally, by employing the various sources of prospects listed in Step No. 1, the need to discriminately

(*Continued on page* 43)

Christmas Sales Campaigns Require Good Publicity

"WE were remarkably successful in our Christmas campaign, using as our slogan 'Electric Gifts are always Appreciated'," reports the manager of the Texas Electric Service Co., Fort Worth, Texas. "Billboards placed at strategic points in various sections of the city proclaimed this in letters so large that the fastest driving motorist could read them. The slogan was used as the caption of all of our newspaper advertising.

"Little folders mailed to all users of electricity illustrated, described and priced a wide range of electric appliances, under the heads $1-2; $2-5; $5-8; $8-12; and $12-20. We also devoted considerable space to electric toys for the kiddies, and electric gifts for mother—the latter being mostly major appliances. For the benefit of all newspaper readers we ran a similar list of electric gifts in our advertising columns.

"Since our main business is to sell electric current we co-operate heartily with all the electric stores and our ads say 'Electric gifts are sold by most electric stores.'

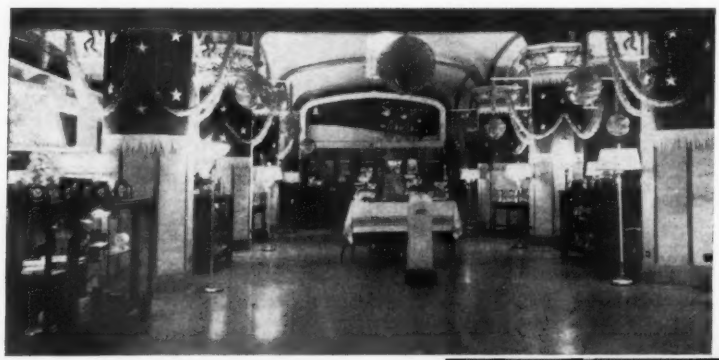
"Our entire series of windows were given over to featuring electric gifts. Each displayed a conventional Christmas tree and a card 'Electric Gifts are always Appreciated.' To attract special attention to this type of gift, we placed in one of our backless windows a huge figure of Santa, ten feet high, seated on a throne. This figure rolled its eyes, and occasionally winked at a pretty girl passing. At his side was a Christmas tree holding a number of electric table appliances, while around the base were many more in a wide range of prices.

"The background of all the other windows was of ivory on which were red and gold stars. Against a blue panel stood a conventional white Christmas tree with red candles. Silver bells, lighted lamps, and gleaming electric table appliances offered a hundred suggestions for gifts."

The entire interior of the office and salesroom was a continuous invitation to buy, so gay and Christmasy were the surroundings. The pillars were wrapped with blue, silver starred bunting, and hung with artificial icicles; ropes of greenery, mingled with colored bulbs, garlanded the long room; and well lighted cabinets held an enticing array of gifts. Over the office was a deep alcove forming a stage, and here three gnomes were seen ringing big silver Christmas bells, which softly pealed Christmas carols. Particularly interesting to modern housewives was the table set for luncheon, with a full complement of china and silver, and a half dozen electric table appliances.

"A decided factor in increasing our holiday sales," asserts the manager, "was our campaign addressed to the younger generation. While the older generation needs it the most, the younger generation is the more easily sold on the desirability of good lighting. So it was to them, primarily, that we addressed ourselves in our holiday campaign to increase the sale of modern lamps and lighting equipment. On the first of December we inaugurated a contest for school students, offering a grand prize of $100; second, $75.00; third, $50; four of $25 each; ten of $10 each; and twenty of $5 each. The very sizeable amounts of the first four prizes, and the large number of secondary prizes caused a wide participation among students of the entire community served by our company. These prizes were offered for the winning essays on the subject 'Why I need good light at home and in school.'

(*Continued on page* 42)



Much headway in load building is made every Christmas by the Texas Electric Service Co., of Fort Worth, through their well-planned electrical gift campaigns. Local dealers benefit through the publicity given electrical items as gift selections.

Oklahoma Utility Executives Discuss Mutual Problems

PRESENT tendencies toward inflation due in part to the European war, and reduced net revenues because of the depression taken in connection with rising operating costs, were among the chief topics of interest presented by speakers at two conferences of the Electric Light & Power division of the Oklahoma Utilities Association. These were the Eastern District conference, held at Okmulgee, October 18, with 126 in attendance, and the Western District conference at Enid, October 25, with 100 registered.

Several of the speakers delivered their papers at both conferences. Problems arising from the servicing and successful management of electrical distribution systems in small towns were discussed in papers delivered at both meetings. The importance of the electrical contractor and dealer to operating electric utilities also was emphasized, as were employee and customer relations problems.

A paper on "Investment Factors in Utility Operations," by B. M. Lester, secretary of the Oklahoma Gas and Electric Co., Oklahoma City, delivered at both meetings, analyzed the national utility financing situation. Mr. Lester said that we have been going through a low interest period when the greatest demand was for bonds. We may be now entering a stock investment period when financing costs will average higher. The speaker declared that it is necessary to borrow money on bonds at rates something less than the maximum return on the investment so that a margin may be left to pay higher dividend rates on stocks. He pointed out the difference between direct and indirect operating costs, and declared that the direct costs are most subject to control.

"What's New in Lighting," was presented at both meetings in a paper by A. E. Warner, lighting engineer, Oklahoma Gas and Electric Co., Oklahoma City. He discussed fluorescent lighting at length illustrating the low power factor element by demonstration apparatus and charts.

"In spite of recent developments in other types of light sources, we may reasonably anticipate that more than a few years will elapse before costs of production can be made sufficiently low to enable the new tubular gaseous conductor lamps to seriously compete in popular demand with incandescent lamps," Mr. Warner said. "Among recent developments in 'controlled light' incandescent sources are the new reflector lamps in 'spot' and 'flood' types with different characteristics for outdoor and indoor uses. These are self-contained units with reflector and lens integral parts of the lamp, as are the new 'sealed beam' automobile headlights."

T. M. Markley, attorney for the Public Service Company of Oklahoma, Tulsa, presented at both meetings, "Recent Changes in Social Security and Old Age Benefits." He said that we can safely presume that the law is here to stay. Eventually he predicted, the employers' share of the rate will reach 3 per cent and it is problematical how many businesses can continue to exist when the operation of the law reaches that stage.

Inflation Feared

"Current Economic Trends," was another subject presented at both conferences by H. H. Ferrin, research department, Oklahoma Gas and Electric Co. He devoted most of his address to the subject of threatened inflation. He said that the all-time high governmental debts are on the side of inflation, but if we recognize the possibilities of the situation and act intelligently, we can pull out without dangerous inflation. The principal source of relief, if the country should experience marked inflation because of the war and other factors, would be the granting of higher rates by state and federal regulatory bodies.

Discussing the subject "Building Load in Small Towns and Dealer Cooperation," at the Western district conference, F. L. Blackburn, Oklahoma Gas and Electric Co., referred particularly to such cooperation in 36 smaller towns, included in the southern division of his company, representing a total investment in electric utility facilities, exclusive of central power plant investments, of $1,371,827. He called special attention to a dealer and contractor cooperation campaign his company had conducted during the four years, 1935 to 1938 inclusive, among the 5,267 residential customers of his company in that territory. He said that these campaigns, including demonstrations and exhibits at fairs, shows, dealers and contractors show rooms, and in customers' homes had re-

Photographed at the recent meeting of the Western District, Electric Light and Power division of the Oklahoma Utilities Association, left to right, H. E. Bowen, Oklahoma Gas and Electric Co., chairman, Western Section; Miss Kate A. Niblack, secretary, Oklahoma Utilities Assn.; A. P. Burns, Southwestern Light and Power Co., secretary, Western Section; and B. E. Lowe, Southwestern Light and Power Co., retiring chairman.

sulted in substantial increases in electric loads in the division. He summarized the results of appliance sales of 76 electrical dealers in the territory during the four years, showing that 8,282 electric refrigerators and 16,809 radios were sold, as well as 6,344 electric washers, 10,624 electric irons, 47 electric ranges and proportionate numbers of many other electrical appliances and equipment. He said that 54% of the rural customers now use electric refrigerators.

Discussing the same subject, L. E. White, lighting engineer, Southwestern Light and Power Co., Chickasha, said that he was convinced that in the progressiveness of lighting salesmen lies the salvation of the utility business in Oklahoma.

"Electrical dealers and contractors play a very important part in load building, in fact we could not build load without them," said the speaker.

Customer Relations Studied

Leading the discussion of the subject, "Customer Contacts," at the Enid meeting, G. B. Dunlap, director of public relations, Southwestern Light & Power Company, Chickasha, told about a new plan being employed by his company, and the parent concern, the Public Service Company of Oklahoma, Tulsa, to find out what the customer is really thinking about the company. He said employees were given an educational course, then furnished with blank forms upon which to record customer information, including facts obtained through visits to the homes of some of the consumers, and these were filed and studied in company offices.

The same subject also was discussed by Ernest Osborne, Oklahoma Gas and Electric Co., at Enid; D. J. Tuepker, Public Service Co., Tulsa, and R. C. Poage, general manager, Oklahoma Utilities Co., Bristow, the latter two at the Okmulgee meeting.

"Employee Relations" was the subject of papers by J. A. Whitlow, vice president and manager at Tulsa, of the Public Service Company of Oklahoma, who appeared at the Oklahoma meeting; by J. A. Federhen, Oklahoma City, public relations department, Oklahoma Gas and Electric Co., speaking both at Okmulgee and Enid; and by S. I. McElhoes, vice president, Southwestern Light & Power Co., Chickasha, speaking at the Enid meeting. Each outlined some of the liberal policies of their companies toward their employees.

"Endeavor to get the employee's viewpoint, treat his views with courtesy, and encourage him to do a lot of thinking for himself," counseled Mr. McElhoes.

Recent depression years have brought to the foreground the problem of earning a fair return on business from small towns. This was revealed by speakers both at the Okmulgee and Enid conferences, in papers and discussions under the title of "Servicing Small Towns." At the Okmulgee meeting, W. B. Harris, Public Service Company of Oklahoma, at Hugo, said that the general plan of his company is to service small towns from a larger, central town, which is in closer proximity to proper service facilities.

L. A. White, Sapulpa, Oklahoma Gas & Electric Co., said that in his company small towns are visited once a week. In every case, he said, the reputation of the company in such towns is in the hands of the service man. V. L. Browne, Southwestern Light and Power Co., speaking at Enid, told of one district of his company in which 12 small towns are serviced by four men, located in four key towns, each taking care of about 350 meters. Otis Howard, at the Enid meeting, said that intelligent revision of service standards, effecting economies wherever possible without lowering quality of the service, has become necessary, if small town business is not to be unprofitable.

"Home Servicing in Outlying Districts," and methods employed in promoting sales of domestic appliances in this connection, were discussed at the Okmulgee meeting by Arvilla Patison, Sand Springs, home economist, Oklahoma Power and Water Co., and by Elsie Pisell, Sapulpa, home economist, Oklahoma Gas and Electric Co.

New Officers Named

Eastern district officers elected at the Okmulgee meeting were T. P. Gilmer, manager, Public Service Company of Oklahoma, Okmulgee, chairman; succeeding E. B. Smith, manager, Oklahoma Gas and Electric Co., at Sapulpa; T. E. Mansfield, vice president, Oklahoma Power and Water Co., Sand Springs, secretary, to succeed Mr. Gilmer. Western District officers selected at the Enid meeting were: H. E. Bowen, division manager, Oklahoma Gas & Electric Co., Enid, chairman; to succeed B. E. Lowe, manager industrial sales, Southwestern Light & Power Co., Chickasha; A. P. Burns, district manager, Southwestern Light and Power Co., at Duncan, secretary, succeeding Mr. Bowen.

R. K. Lane, president, Public Service Company of Oklahoma and chairman of the Electric Light and Power Division, Oklahoma Utilities Association, addressed the Okmulgee meeting. Noonday luncheons and entertainment were provided at both meetings.

Mass Demonstrations Solve Washer Problem

"INSTEAD of going to a home to handle a demonstration washing we find it much more satisfactory to do a mass job at the appliance department," said David H. Rice, manager of the Rice Furniture Co., Jackson, Miss. "We recently ran a full page ad calling attention to our new electric laundry equipment. During the entire week, we gave demonstrations three times daily. We invited all interested to bring their soiled laundry and have it done free. And we especially invited the general public to witness any of these demonstrations. There were always groups of people watching and listening to the demonstrator, and naturally, they strolled about the store, so all our furniture lines received valuable publicity.

"In order to start briskly the sale of the laundry equipment we offered free 55 pieces of linen with the first 25 units sold. They were nationally known items—sheets, pillow cases, bath towels, hand towels, wash cloths and luncheon sets, and this spurred a number who had considered buying laundry equipment to 'do it now.'

"The laundry equipment was set in rows all around our major appliance department, and whenever a unit was sold it was immediately carded with the name of the purchaser. After the first few were carded, sales came much easier, as nearly everyone who visited the department saw that at least one of her acquaintances had made an electric laundry purchase."

CONTRACTING SECTION

Industrial Rewiring Promoted By Free Survey Service

NOT many months ago, two men called at the Marshall & Bruce Printing Company, in Nashville, and asked to see the plant superintendent. Admitted to his office, they asked him point blank how the plant's equipment was running, and if his power bills appeared to be in line.

"Frankly," said the superintendent, "things are far from running smoothly. We can't run all the machines at peak capacity and our power consumption seems unusually high for the operations involved."

"How about letting us make a study of the wiring and circuits, just to see if there's anything haywire?" asked the visitors. The super shook his head. "Afraid the budget wouldn't stand it," he replied.

"Oh, yes, it would," said the visiting engineers. "The survey will be free, just part of the service of the Electrical Construction Company."

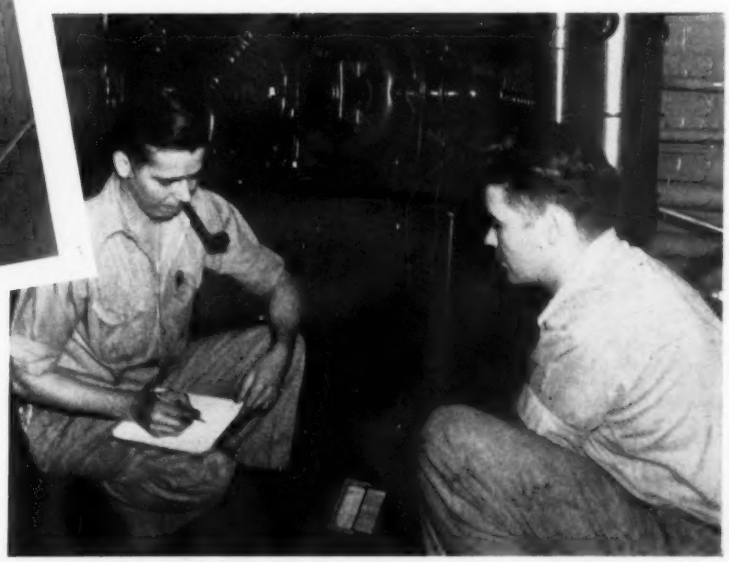
With the superintendent's delighted agreement, the Electrical Construction Company's survey experts unlimbered their equipment and started checking. They checked the main switchboard and overcurrent protection in the printing plant, they checked the circuits for general condition, loading, and voltage drop, they measured load and rpm of the motors driving the presses; in fact, they checked everything electrical in the plant.

At the end of several days, they again sought out the superintendent, and presented him with a complete report of their findings, clearly and concisely stated on a special survey form developed by the company, with space for comment in detail on every factor in the industrial plant's electrical system. This report showed that the plant's switchboard was overloaded, inadequate and dangerous; that a number of circuits were inadequate for the load they were carrying. The engineers pointed out how a modernization of the system would undoubtedly permit the plant to operate at peak capacity, and would reduce power losses and unnecessary power consumption.

Then they said: "You're under no obligation for this survey! if you have this needed work done, you're free to hire any contractor in the city, without any strings from us. But, if you have the work done, naturally we'd like to bid on it."

The Marshall & Bruce Company had the work done, and, needless to say, the Electrical Construction Company obtained the contract.

That's the way Louis Hansberger works. Mr. Hansberger, president of the Electrical Construction Company, decided four years ago that plenty of good wiring business was hidden in Nashville's industrial plants, and that it would probably remain hidden until the plant might break down or a fire break out. Unwilling to "wait-and-bid" on new construction business, unwilling to see a



Louis Hansberger, at left, looks over the results of one of their business getting surveys with his assistant, Frank Gilliam. Below, a typical scene as a survey crew goes into action.

lucrative repair field remain uncultivated, Mr. Hansberger decided to go after it.

"Such jobs seldom come in your front door," he commented, "because there's always a plant maintenance man who can patch things up, and, in days when economical operation is necessary, a plant owner will hardly ever go into extensive repairs until he's shown the handwriting on the wall. He won't, nine times out of ten, have any idea of the situation actually existing within his wiring system. Much less will he pay anyone to do the work of analyzing his system. So, in order to show him the handwriting on the wall, we instituted a survey and consulting service entirely without cost to the plant owner, and, having shown him the true situation, leave it to his good judgment whether or not to do the work, and who shall do it."

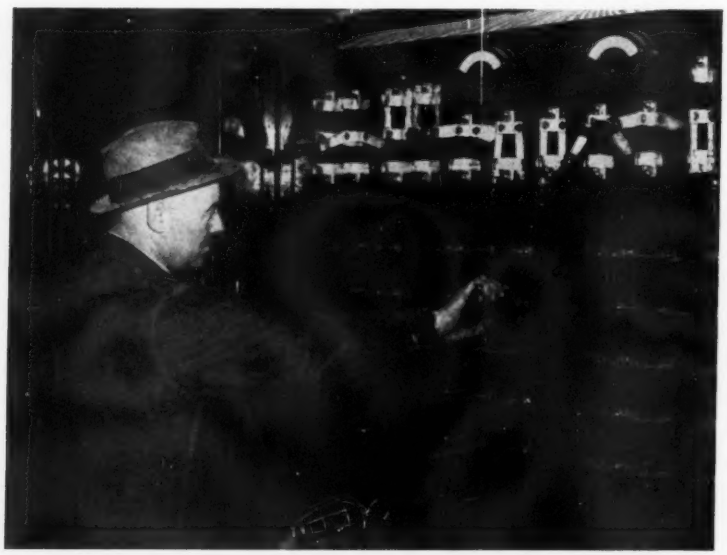
"Naturally, the work is usually done, and we usually get jobs growing out of our surveys. We've been working this way for four years, and its enough to say that our three solicitors and fifteen electricians are kept busy."

The solicitors, highly trained in the use of testing instruments, make regular calls on the industrial plants in Nashville and nearby towns. First, they offer themselves as consultants to the engineers in the plants, for discussion of any problem which may have arisen in the plant. They're entirely ready to make a suggestion or help with a minor repair and go their way without cost to the plant.

Whenever something seems seriously wrong, they go into action in a complete testing survey of the plant, and present the results to the management. Two men work on such a survey, beginning at the service entrance equipment of the plant, then checking all circuits and finally the motors and other current consuming devices. One man handles the testing instruments, including ammeters, voltmeters, lightmeters, tachometers, etc., and the other makes recordings on their special charts and forms.

The survey includes not only a study of the condition and efficiency of the electrical equipment, but also a complete check on the adequacy and efficiency of the

(*Continued on page* 42)



The surveys offered by the Electrical Construction Company cover every phase of the electrical equipment of an industrial plant. Athough no charges are made for the surveys, they have produced much profitable business for this progressive contracting firm. They have learned that plant managers will lend a willing ear to their sales story on how plant efficiency can be increased through electrical modernization, when such stories are supported by the conclusive evidence uncovered in their surveys.

Burglar Alarm System Sold Through Portable Display

A PORTABLE burglar alarm demonstration box proved a most effective means of interesting prospective customers of the Levy Electric Company of Knoxville, Tennessee, in installations of alarm systems. The demonstration kit was developed by Melvin Levy, who is associated with his father, Sam Levy, in the business.

A portable radio cabinet, the kind with a lower compartment for batteries and a hinged top, was used as the cabinet for the demonstration kit. The hinged door of the box has a glass window which, for demonstrations, represented the door of a store or a window. Just inside the door was stretched a piece of wire which represented the different types of "trip" used in connection with the burglar alarms.

When the door was opened and the wire was touched, the alarm rang. Across the window of the demonstration box was a silver foil strip which when broken sounds the alarm, just as would be done if the window of a store was broken.

The box contained other miniature "trips" that could be used. And a demonstration was even given of how it could be connected up for a fire alarm, too, if desired. The lower compartment contained the batteries from which the alarm bells were energized.

"I found that demonstrations are often necessary in order to sell burglar alarms," said Mr. Levy. "You can't just tell a prospect that he should have one installed. He wants to see for himself how it works.

"So I worked up this demonstration kit and began a definite campaign. I called on grocery stores, filling stations, and other places of business. I would open up the box and demonstrate to the prospect just how a burglar alarm would work. It didn't take a lot of special equipment or a lot of extra work. Opening the door of the box and touching the trip showed just what would happen if the door of the store was opened. Or the prospect was shown what would happen if a window was broken.

"With one form of trip we used, the stretched wire, the prospect was shown that it could be wound up on a reel during the day, but must be set before he leaves at night. Of course, we had other forms of trips to demonstrate, too, and we showed him that we could give him a combination of burglar alarm and fire alarm.

"Often a prospect would study a way to try to beat the alarm. I've seen them sit and study over it for half an hour or so. They would try to figure out where they could get in without the alarm going off; they would worry over it. It was fun watching them. But they couldn't beat it and of course their interest made it easier to sell them."

In going after business, Mr. Levy didn't confine himself to casual calls with the portable set.

He would watch the newspapers for news of robberies. Then he would call on the store and try to sell the operator a burglar alarm for protection in the future. He didn't require much sales talk or demonstrations in those instances. They knew the need for one—the loss in the robbery was the best sales argument. But even victims of robberies would not always buy an alarm system.

"Sometimes they would say that they had lost so much that they couldn't afford to install a burglar alrm," laughed Mr. Levy. "Others, though, didn't want another loss and would order an installation.

"We use either the open or closed circuit system. We prefer the closed circuit, in most cases. On either circuit, we figure the average upkeep is not more than $5 or $6 a year.

"We build a system according to the needs of the customer. We use the regular standard burglar alarm systems. Our installations are not any different than others. A combination of manufacturers' equipment is often used which will give the best results.

"The systems have the constant drop delay and master control for locking up. If a door is opened, the alarm won't stop ringing, even if the door is closed, until it is turned off with the key for the master control.

"We find that after getting business, as we did during the demonstration campaign, people who ordered installations are pleased with them, and tell others, which helps to increase sales."

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Understanding and Using the National Electrical Code

By B. Z. Segall

New Orleans Public Service, Inc.
New Orleans, Louisiana

IN this eighth article of his series on the Code, Mr. Segall discusses the requirements relating to services, covered in Article 230. Other articles in this series have appeared in foregoing issues, beginning in April, 1939.

THE sections of the Code on services are grouped into eight divisions. The general requirements for services are grouped in section 2301 through 2308. The specific additional requirements for underground services are included in sections 2311 through 2314. The specific rules for the service drop conductors, the wires from the pole to the first house attachment, are covered in sections 2321 through 2326.

The additional requirements for the service entrance conductors, wiring from the first house attachment through to the main service switch or switches, are explained in sections 2331 through 2339. Sections 2351 through 2359 give the requirements for the service disconnect switch. Sections 2371 through 2375 state the rules for service overcurrent protection. Sections 2381 through 2382 explain the grounding requirements for the service and service equipment. The final sections, 2386 through 2393, state all the requirements for services operating at voltages above 600 volts.

In the second article of this series (See April 1939 issue) Figures 1 and 2 illustrate the parts of a service as defined in the code. It will be well for the reader to refer to these so that he may keep clearly in mind the components of the service as they are discussed in the following paragraphs.

Section 2301 is clear and definite. In general, services must be protected from mechanical injury and must not offer any interference to the use of fire fighting equipment.

Section 2302 is very important. It should be discussed in conjunction with section 2351 as the latter is more or less a corollary requirement to section 2302. The general rule allows but one set of service conductors to any building. However, three exceptions are made to this requirement.

The first exception refers to section 2321 wherein more than one service drop is allowed to take care of five special conditions: It is advisable to have a separate service for fire pumps. It may be necessary under certain conditions to cut off all service to a building when fighting a fire. The use of a separate fire pump service would more or less insure the operation of the pumps under all conditions.

Emergency lighting for theaters, auditoriums, schools, etc., should be arranged for operation from two sources of power. In many cases the code requires a separate service for emergency lighting. The installation of emergency lighting will be more thoroughly discussed in a future article.

The third exception allowed under section 2321 is the use of multiple service for very large loads. One service in a building may take care of the lighting and miscellaneous power loads such as elevator motors, water pumps, etc If a large air conditioning motor load is to be added, it may be more desirable to install a separate service to take care of this large load. This rule recognizes that two or more services may be required for different types of loads such as a three wire, 120/240 volt, single-phase service for lighting; a three-wire, 240-volt, three-phase service for power; a two-wire, 440-volt, single-phase service for an arc welder, etc.

If these are obtained from a system having secondary mains fed from separate transformers this exception is applicable. Two separate services, one three-wire, 120/208-volt, single-phase and one three-wire, 208-volt, three-phase, derived from a four-wire, 120/208-volt "Y" system of distribution mains would not come within the scope of this exception. The mains in this case would be fed from the same bank of transformers. The same would be true for a four-wire, 240-volt "delta" system.

The fourth exception allows two or more services to a building covering a large area. Such an exception is necessary if a building owner is not to be penalized by the excessive cost of installing extra heavy feeders from one central

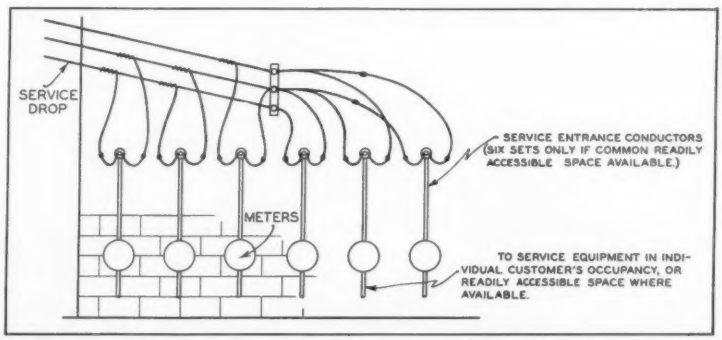

SERVICE DROP
METERS
SERVICE ENTRANCE CONDUCTORS (SIX SETS ONLY IF COMMON READILY ACCESSIBLE SPACE AVAILABLE.)
TO SERVICE EQUIPMENT IN INDIVIDUAL CUSTOMER'S OCCUPANCY, OR READILY ACCESSIBLE SPACE WHERE AVAILABLE.

Fig. 21. Illustration of the general exception recognized in section 2302 which allows two or more sets of service entrance conductors to be tapped from one service drop.

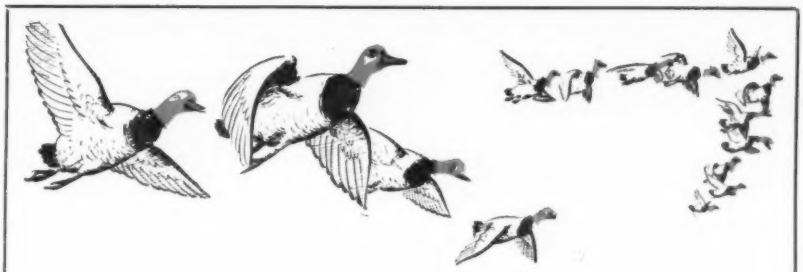
point in a building to insure proper voltage throughout the building.

The fifth exception of section 2321 takes cognizance of the fact that in a building having several tenants it is quite possible that the building may be so arranged that no one point within the place is accessible at all times to all tenants. The installation of one service in such a building would make the service equipment of some of the customers inaccessible and beyond their control.

The second general exception recognized in section 2302 allows two or more sets of service entrance conductors to be tapped from *one* service drop. Section 2351b gives a cross reference to this section 2302b. There it is stated that a multiple occupancy building may be supplied by any number of sets of service entrance conductors as allowed by the exception in section 2302b. However, if there is a "common readily accessible space," inside of the building, readily accessible to all tenants, and of sufficient size for mounting all the individual main service disconnecting and overcurrent protective devices, then only six such taps may be made on the outside of the building to the one service drop. (See Figure 21).

Instead of installing several sets of service entrance conductors, one main set may be installed and taps taken off of this main set on the outside of the building to any number of sub sets provided there is no "common readily accessible space." If such a space is available then here again only six taps are allowed. (See Figure 22). Of course, if more than six taps are required where the "common readily accessible space" is available, then a main switch must be installed in the main service entrance conductors ahead of all the tapped sets of such entrance conductors.

The third exception in section 2302 allows the installation of one more set of service entrance conductors on an existing service drop feeding a single occupancy. This second set of service entrance conductors may be installed to take care of a different class of use. For example, a three-wire, single-phase service may be installed in a home for general lighting. At some later date the owner may decide to install an electric range. He may take a tap from this exist-



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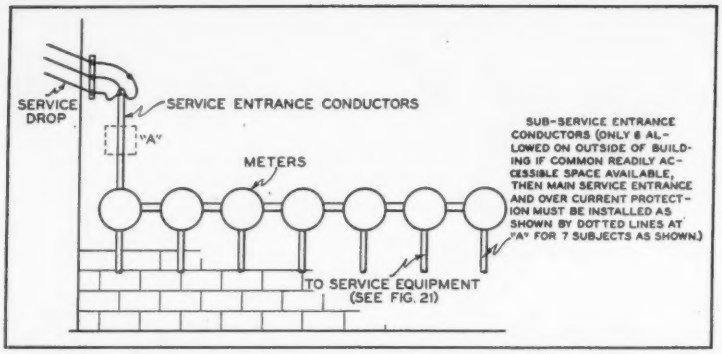

SERVICE DROP
SERVICE ENTRANCE CONDUCTORS
"A"
METERS
SUB-SERVICE ENTRANCE CONDUCTORS (ONLY 6 ALLOWED ON OUTSIDE OF BUILDING IF COMMON READILY ACCESSIBLE SPACE AVAILABLE, THEN MAIN SERVICE ENTRANCE AND OVER CURRENT PROTECTION MUST BE INSTALLED AS SHOWN BY DOTTED LINES AT "A" FOR 7 SUBJECTS AS SHOWN.)
TO SERVICE EQUIPMENT (SEE FIG. 21)

Fig. 22. Instead of installing several sets of service entrance conductors, one main set may be installed and taps taken off of this main set on the outside of the building to any number of sub sets provided there is no "common readily accessible space."

ing service drop and install another set of service entrance conductors, as shown by Figure 21, and extend these to his range.

Section 2303 requires that each service supplying any occupancy must under all conditions be entirely within the control of that occupant. If several buildings occupied by different tenants must be served through other buildings the services for these tenants must be extended in a conduit or duct lines buried in at least two inches of concrete beneath a building or in at least two inches of brick or concrete within a wall of these buildings. This insures complete isolation of the services until they enter the individual customer's premises and assures him sole control over his service.

Insulation Requirements

Section 2304 states all the general rules governing the type of insulation to be used for covering the various sections of wires which go into the makeup of a complete service. The general requirements are: (1) the insulating covering must normally withstand exposure to atmospheric and other conditions of use, and (2) the insulating covering must prevent any detrimental leakage to adjacent conductors, objects or to the ground.

Section 2304a states that the neutral wire of a service may be uninsulated (bare) provided: (1) that the secondary supply system maximum voltage to ground does not exceed 150 volts, and (2) if as provided by section 2595a on grounding, there is one additional ground on this secondary at the transformer or elsewhere on this section of secondary mains.

For the service entrance conductors this bare neutral must be a part of an approved service entrance cable or installed in a rigid metal raceway (conduit or electrical metallic tubing). It should be remembered that a smaller size wire may be used for this uninsulated neutral since a bare wire has a higher rated current carrying capacity. For example, a 100-ampere, three-wire, single-phase load could be served by two No. 1 rubber covered wires and a bare No. 3 wire. Column C in Table 1 of Chapter 9 should be used to determine the capacity of the bare neutral wire.

Section 2304b allows the use of rubber, paper, cambric or other approved insulation for underground service conductors. If the cables are to be installed in conduit buried in concrete or masonry, in direct contact with the earth, the cable must have, in addition to the insulation, a lead sheath. If the cable is to be buried directly in the ground, then an approved type must be used. Many non-leaded types having a synthetic rubber covering over the insulation have been approved for direct burial in the earth. These cables are also suitable for use in place of lead sheathed types in conduit.

Section 2304c deals with the insulation of the service drop wires. If a cable is used, the neutral may be bare but the other wire must have rubber insulation. The bare neutral can only be used where the voltage conditions and grounding has been taken care of as outlined in section 2304a. If separate wires are used then either rubber or weatherproof insulation must be used on all wires.

Section 2304d requires service entrance conductors on the exterior of buildings to have rubber insulation if in cable form or in a rigid metal raceway. If run as individual open wires, they must have a weather-proof insulation. Where individual open conductors enter a building, the wires must be rubber insulated. The bare neutral may be used as outlined in section 2304a.

Service Conductor Size

Section 2305 states the rules governing the size of the service conductor. In general these must: (1) have adequate current carrying capacity, without exceeding heat capacity of insulation, and (2) must have adequate mechanical strength.

Section 2305 augments (1) above by stating that under all conditions the conductors must be capable of carrying their load in accordance with the current carrying capacities set up by Table I in Chapter 9. Further, this section states that the minimum load shall be calculated as required by section 2202 in Article 220 on feeders. This procedure was fully covered in the seventh article of this series. (See October 1939 issue).

Section 2305b further augments the two above general requirements by making it mandatory to use nothing smaller than the following sizes for service drop conductor: (1) No. 10 soft drawn copper, or (2) No. 12 medium or hard drawn copper. The use of No. 8 wire has been most general for service drop conductors.

Section 2305c requires that a minimum size of No. 8 wire be used for the service entrance conductors. However, an exception is made where only one branch circuit is required. The service entrance conductors may be of the same size as the branch circuit wiring but cannot be less than No. 12. It is well to keep in mind that this minimum of No. 12 should only be used if it is definitely felt that a No. 12 service will be ample also for any future load that may be installed on this one circuit.

The size of the grounded conductor is detailed in section 2305d. It must be the same size as the ungrounded conductors for sizes up to No. 8. It may be smaller than the ungrounded conductor as outlined in Section 2203 for carrying capacities of the neutral feeder but cannot be smaller than a No. 8 wire.

(*Continued on page* 41)

Production Line Methods Applied In this Motor Repair Shop

By H. E. Grant

Tennessee Electric Motor Service, Nashville

INCREASING number of small motors in operation on electric refrigerators, stokers, blowers, pumps, and other appliances, has resulted in a considerable volume of small motor rewinding and repair work. The motor service shop desiring to handle this work profitably must develop methods which will enable it to handle such work very quickly and at a very low cost.

My firm is operating a shop that does nothing but small motor work. We handle nothing larger than 3 hp and have been operating with a fair amount of success on this basis for three years. Our methods and experience should be helpful to the electrical contractor who is giving consideration to the expansion of his business into this field.

Our experience indicates that the motor service shop must have a fairly large volume in order to make a reasonable profit in this business. An average volume of approximately twenty motors per day is required to operate a five man shop at about maximum efficiency.

To handle this type of work satisfactorily, the contractor should set up a separate department, the size depending upon anticipated volume.

Flat Rates Suggested

For best results, he should prepare a flat rate price schedule covering the most popular type motors showing prices per horsepower for the different classifications of repairs such as minor repair, major repair, and complete rebuild. The price schedule should be competitive with other shops specializing in small motor work in the same community.

For a small motor repair shop, the contractor will need a different type mechanic, preferably young men who can be trained on production methods and to do one particular part of the work well. Special equipment such as speedy coil winders, dynamometer test stands, Yankee screw drivers, and many other high speed tools will be required. Also, modern stock methods must be developed in order to eliminate wasted time of employees going to the stock room for material for each job.

In making plans for such a department, the electrical contractor must not lose sight of the fact that he is entering a business in which he will have to sell for approximately $139, work that costs him in material and labor about $100.

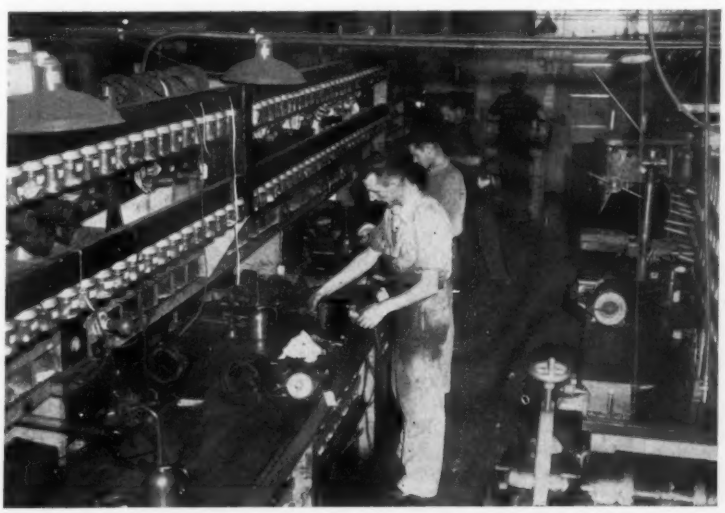
The arrangement of our own shop and our methods of handling small motor repairs may be helpful to the electrical contractor planning such a department.

We have a number of separate benches designed for specific operations. For example, one bench is used for disassembling motors and is equipped with test apparatus and a wash tank; another bench is provided for assembling motors; another one near the assembly bench is equipped with arbor press, drill press, grinder, vice, etc., and special benches are also provided for stripping, insulating, winding stators, winding armatures, testing and soldering armatures, and finishing and shipping.

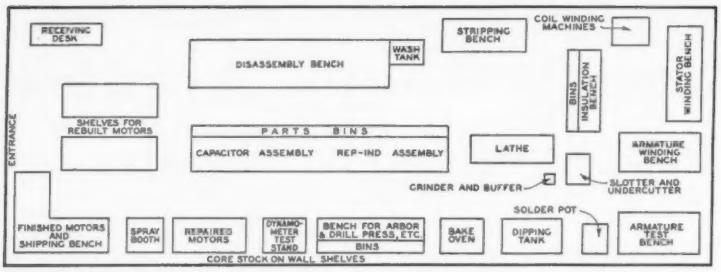
Our major equipment consists of a dynamometer test stand, a medium size lathe, a coil winding machine, a set of balancing ways, slotters and undercutters, an air compressor, a paint booth, an arbor press, drill press, grinder, buffer, as well as other ordinary testing equipment and smaller tools.

Convenient Parts Storage

Dozens of bins are provided above and under each bench where parts are needed. For instance, on the bench where the arbor press is located, we have bins containing our bearing, commutator and governor weight stock, everything that has to be pressed in, or on, is within reach of the arbor press operator. Brushes, brush holders, short circuiting devices, and the dozens of other small parts needed in the assembly of repulsion-induction motors, are located in bins and receptacles at that end of the assembly bench. Similarly,



The main assembly bench is shown here. Note methods of stocking parts so that no time is lost in trips to storeroom. At right is bench for arbor and drill press and bins containing bearing material.



This arrangement of the work benches and equipment was designed to facilitate "production line" handling of small motor rewinding and repair jobs. As described in the article, this procedure enables the Tennessee Electric Motor Service to handle this work on a very profitable basis.

parts peculiar to capacitor and split-phase motors are located in bins at the ends of the bench designated for the assembly of motors of these types. Also, oil wicks, oil well covers, conduit box covers, etc., are located in bins in the center of the bench where the finishing touches are made to motors going through the production line.

Factory-Cut Insulation Used

In the same way, the bench designated for insulating work is located between the armature and stator winding benches and carries bins in which are kept the various types of insulation required. Incidentally, we buy the major part of our slot insulation and wedges directly from the factory, ready cut and shaped. Because we are thus assured of a perfect fit and a considerable saving in time, we have found that this is more economical than cutting and shaping our own insulation. Factory-cut insulations are available for about 80% of the jobs we handle.

We have not found it advisable to keep individual records of what material goes into each job as we have found that on a monthly basis our total material cost will not vary more than a few per cent one way or the other. Such a system is feasible, of course, since we are repairing motors by the dozen rather than one at a time, and all on a flat rate basis.

A small motor shop will find it advisable to obtain as many popular size frames as possible and build up an exchange stock of rebuilt motors. At first, this can be done by selling new motors and taking in the old frames at a small allowance. Also, it is advisable to build up a large stock of the popular type armatures and stators.

The benefit of this so-called "core stock" is gained by the fact that in dull times you can keep your winders busy on these stock units getting them ready, and at such times when you are rushed to the point that the winders cannot keep up with the incoming jobs, the assembly man can use up this surplus stock and tide the shop over a rush period, without the addition of extra and inexperienced help.

This so-called core stock is absolutely essential in the successful operation of a small motor shop. Although it requires time and expense to build up this stock, its benefits are repaid after it is once obtained. For our volume, we maintain a core stock of approximately 100 armatures and 100 stators and we would like to build this up even to a larger number. In the same way, the stock of rebuilt exchange motors helps maintain an even flow of work for the assemblers each day.

Production Line Routine

The general routine of our production line is about as follows: When motors arrive for repairs, a repair card is made out showing the customer's name and address, date, horsepower, make and serial number. A tag bearing the customer's name is attached to each motor. All repulsion-induction motors are placed in one lot and capacitor and split-phase motors in another. In lots of 12, we place the repulsion-induction motors side by side on the front of the proper disassembly bench. On the back side of the bench opposite each motor, we place a 10" by 14" bread pan of the dime store variety. The tag attached to each motor is removed and tied to the handle of the pan opposite that particular motor. Then with speed tools, the motors are disassembled. The various parts, except the armature and stator, are placed in the pan opposite each motor. The man at this bench goes down the line and works the 12 motors as a group.

On the next operation, by means of a test set that glides on a track, the entire length of the bench, each armature and stator is tested for electrical defects and examined for visual defects. The defective units are laid aside as they are found and the good units are placed in the pans with the balance of the motor parts for that particular motor.

After the group is finished, the man goes to the back of the bench and proceeds to wash and clean with compressed air the parts of each motor. The wash tank is conveniently located at the end of the disassembly bench and directly behind the assembly bench. After washing the motors, the operator turns and places the pans on the back of the assembly bench where they can be reached readily by the assembler.

Split-Phase Motor Handling

The capacitor and split-phase motors are handled in the same way as the repulsion-induction motors except that no tests are made on the disassembly bench. We have found that an analysis of this type of motor is made more easily by the capacitor assembly man and he jots his analysis down on the tag after which it goes to the disassembly bench for complete disassembly and cleaning.

The repulsion-induction assembler replaces from the core stock, which is just behind him, any armature or stator that has been found defective and places them in the proper pan. If he finds that he does not have a particular unit in stock, he sets this job under the back side of his bench and gives a "today sure" notice to the winding department for that particular job. He then proceeds to turn and resolder all armatures in the group that may require such treatment. After that, they are balanced and receive new governor weights, where needed, and placed back in the pans. Then, on each stator, he installs new leads where necessary and leaves them on the bench before each pan. Next, he tests and where necessary installs new bearings and bolts the end frames to the stators. After this, by means of an align-through ream-

er, he reams all bearings to fit. This completed, the end frames are removed and mechanism is installed on the armature with worn parts being replaced such as brushes, brush holders, etc. After this, the motor is completely assembled except for oil wick covers, etc. The motors are then tested on the dynamometer test stand and final adjustments are made. The finishing touches such as installing oil wicks, covers, painting, etc., is done by a less experienced man at the finishing bench.

Capacitors and split-phase motors go through the same routine at the assembly bench reserved for these types of motors.

The defective armatures and stators are placed on the stripping bench and stripped of the old windings and insulation. After this they are insulated and the coils are wound, wherever possible, in groups of several of the same make and types. All stators are wired with coils made up on a winding machine that turns at 250 rpm. On the popular type job, we always make several sets of coils at a time and store the extra sets for future use. The coils are inserted by hand and, on completion, the stator undergoes a ground test of 1200 volts. All dipping is done at one time near the end of each day.

Armatures are wound by hand and a new commutator is installed on about 90% of the jobs. Where old commutators are sound and good, the wire slots are cut out on a milling machine which also serves as an undercutter when needed. All vertical commutator jobs are soldered by rolling the edge in molten solder, and horizontal jobs are soldered by dipping in molten solder. Ruby fluid flux is used in most cases.

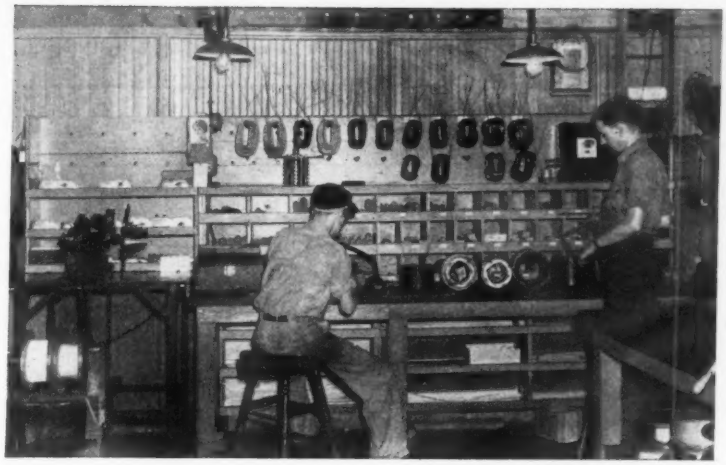
All baking is done at night except on special jobs, and each job is baked only once using black baking varnish of a medium grade.

Our method of paying productive help is somewhat different from that used by many of the larger shops. We pay our productive men 40% of the net labor charge, figured on a monthly basis. By net labor, we mean the gross amount received for repair work less the amount paid for material and other operating expense. We pay each man, according to his value, a certain base pay on a semi-monthly basis. At the end of each month, when the amount of net labor charge for that month has been calculated, we deduct 40% of it from which each man's base pay is deducted. The amount that remains is divided among the men in the same ratio as their base pay and given to them as a bonus.

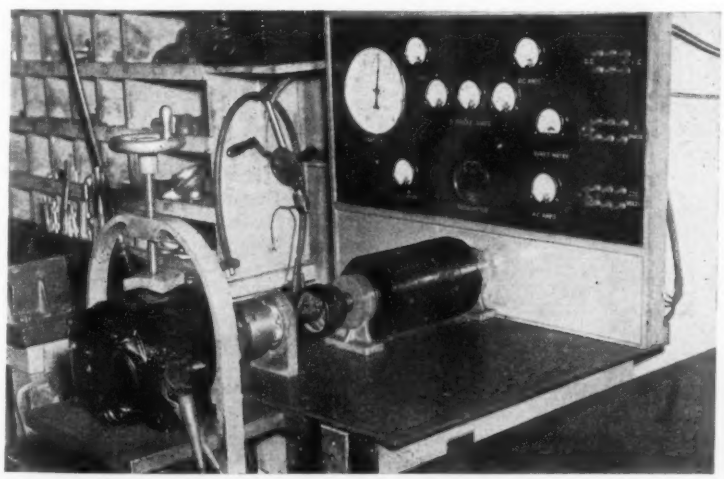
This system has the advantage that a greater amount of work handled means more pay for each man and, also, that if any work comes back as unsatisfactory, the men do not receive any benefit from it with the result that there is a greater incentive for more careful workmanship.

Also, as the parts used are a factor in the size of the net labor figure, the men will not use parts unnecessarily. Yet they will not skimp on parts for fear of a returned job. We do not work overtime except in extreme emergencies at which time the men are paid considerably in excess of their regular rate and the jobs are handled special and not subject to our printed flat rate prices.

We have found it advisable to take advantage of every labor saving tool available. We have many special tools such as Carboloy tipped turning and boring tools, special plates for pulling off parts without damage, also special arbors for pressing on commutators and governor weights, arbors with which we are able to press out old bearings and press on new ones in one operation.



A view of the stator winding bench. Note popular type coils made up in advance and held in reserve for fast moving jobs. Winding machine is to be seen at left, high voltage test bench at right. Bins contain insulation in factory cut and shaped sizes.



The dynamometer test bench is an important item of test equipment. With it motors may be tested under known conditions of load and speed with instruments indicating essential data.

ENGINEERING SECTION

"Out-of-Step" Blocking Relays Reduce Line Interruptions

By E. C. Sawyer

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Gulf States Utilities Co.
Beaumont, Texas

IN applying protective relays to transmission tie lines between generating stations, consideration must usually be given to out-of-step conditions as well as to actual line faults. Undesirable operations of relays may result, especially with relays of the impedance type, unless special blocking devices are used.

On the connecting transmission lines between the two main generating stations of the Gulf States Utilities Company out-of-step blocking relays have been installed which operate in conjunction with impedance line relays at several intermediate switching stations. While there are several other blocking schemes now in use, most of these require the use of carrier current or pilot wires. The scheme described here uses no interstation pilot channels and yet provides selective tripping as well as blocking on out-of-step conditions.

Between the "Louisiana" generating station at Baton Rouge, Louisiana and the "Neches" generating station at Beaumont, Texas, the 185 miles, 66 kv connecting line is broken into sections by oil circuit breakers at four intermediate distribution points as shown in Figure 1. Protection against line faults is obtained with directional ground relays and high speed impedance line relays on each oil circuit breaker. Power is normally flowing into this interconnection at each generating station so that, if any one section is opened, no intermediate station is interrupted and no serious change in power flow results. Sometimes, however, unusual system disturbances occur which cause the Neches and Louisiana Stations to pull out of synchronism. Previous to the installation of the out-of-step blocking equipment, this often caused the tripping of breakers in more than one line section, giving an interruption to one or more intermediate stations.

The performance of impedance type relays during out-of-step conditions has been discussed in several technical papers, (see references (1) and (2) at end of article) so will be treated very briefly here, considering their performance on this specific power system. As the two generating stations swing apart, the stations near the middle of the connecting line experience an increase in current and a drop in voltage equally in all three phases. At 180° phase difference between the two generated voltages, the current reaches maximum and the voltage becomes zero at the electrical center of the system, a point near the middle of the connecting line. Since impedance relays respond to over-current and subnormal voltage, it is obvious that they will operate, first near the middle of the line, and later, at points nearer to the generating stations. Due to the circuit breaker operating time, before the line can be opened at the first station, the angular difference may increase enough to operate relays at other points along the line. Thus, circuit breakers may be tripped at several stations. Except in very rare cases, the voltage does not drop sufficiently at the generating stations to cause relay operations at these points.

At the 180° pull-out point, the current and voltage magnitudes and phase relations are the same as if a three phase line fault existed at the electrical center. However, as distinguished from an actual line fault this condition is approached gradually—a characteristic on which an out-of-step blocking scheme may be based.

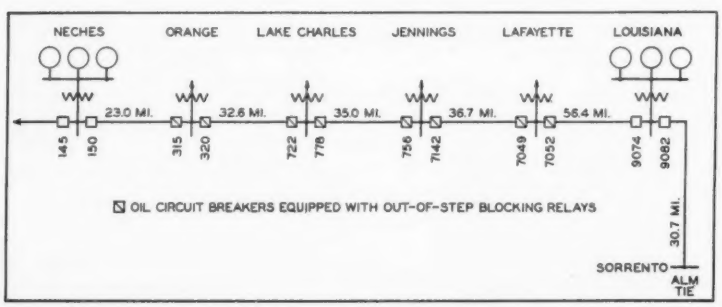


Fig. 1. One line diagram of Gulf States Utilities Co. 66 kv line connecting generating stations and showing intermediate switching stations.

Operating Requirements

A scheme was desired which would:

(1.) Not interfere with the normal function of impedance relays in clearing line faults.

(2.) Prevent more than one breaker from opening on out-of-step conditions.

(3.) Provide selective tripping on out-of-step conditions so as to separate the system quickly at a preferred point.

(4.) Require a minimum of change to existing relay equipment.

After considerable study of the performance of the system during out-of-step conditions, the cooperation of the Westinghouse Electric and Manufacturing Company was

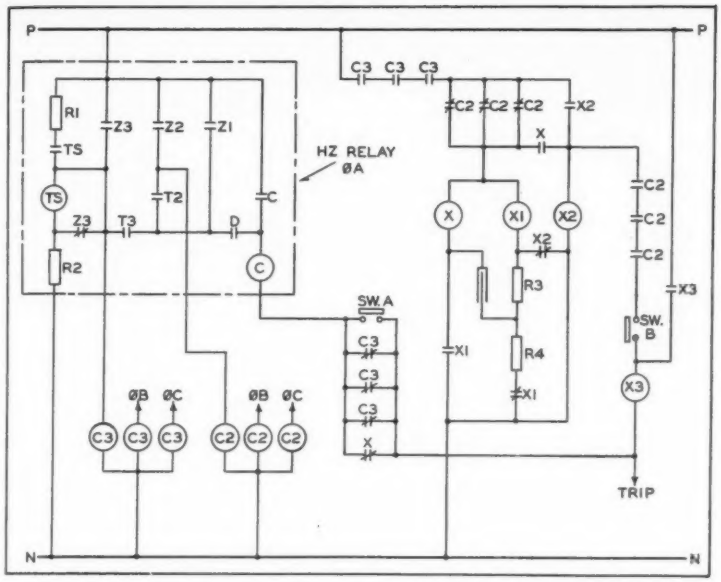


Fig. 2. Schematic diagram of out-of-step blocking scheme including the d-c circuits of one HZ impedance line relay. Z1, Z2, Z3=1st., 2nd., 3rd. zone impedance contacts; T2, T3=2nd. and 3rd. zone timer contacts; TS=timer control contactor; D=directional element contacts; C=tripping seal-in contactor; C2, C3=2nd. and 3rd. zone SM relay elements; X, X1=SG relays in capacitor-resistor delay circuit; X2=blocking seal-in SM relay element; X3=preferred tripping seal-in SM relay element; Sw. A=selector switch contacts, normally open; and Sw. B=selector switch contacts, open for blocking, closed for preferred tripping.

secured in developing special relays which would fulfill the above requirements.

Eight sets of these were installed in the four intermediate stations—one set for each oil circuit breaker. Figure 4 shows the relay switchboard at Orange Station with the blocking equipment for two breakers mounted together on one panel section.

The blocking relay equipment for each oil circuit breaker consists of two special SM relays containing miniature high-speed contactors, a selector switch, two SG auxiliary relays, and a capacitor-resistor combination unit. Connections between these various elements and the HZ impedance line relays are shown schematically in Figure 2—the standard a-c connections to the line relays are omitted for simplicity.

The second and third zone contacts of the impedance relays each operate a separate SM relay element so that, for purposes of explanation, the C2 and C3 contacts may be assumed to operate simultaneously with the Z2 and Z3 contacts. SG relays X and X1, together with the capacitor-resistor delay arrangement, serve to open the HZ relay trip circuit for a definite time whenever blocking is required.

How the System Operates

In analyzing the operation of this blocking equipment, assume the system to pull out of step and observe the relay performance at an intermediate station with the selector switch set for blocking. Since the three impedance measuring elements of each line relay are adjusted for different values or zones, they operate in sequence as the pull-out increases and their contacts close in the order Z3, Z2, Z1. Usually the current and voltage in the three phases are closely balanced and the corresponding contacts of all three phase relays operate together.

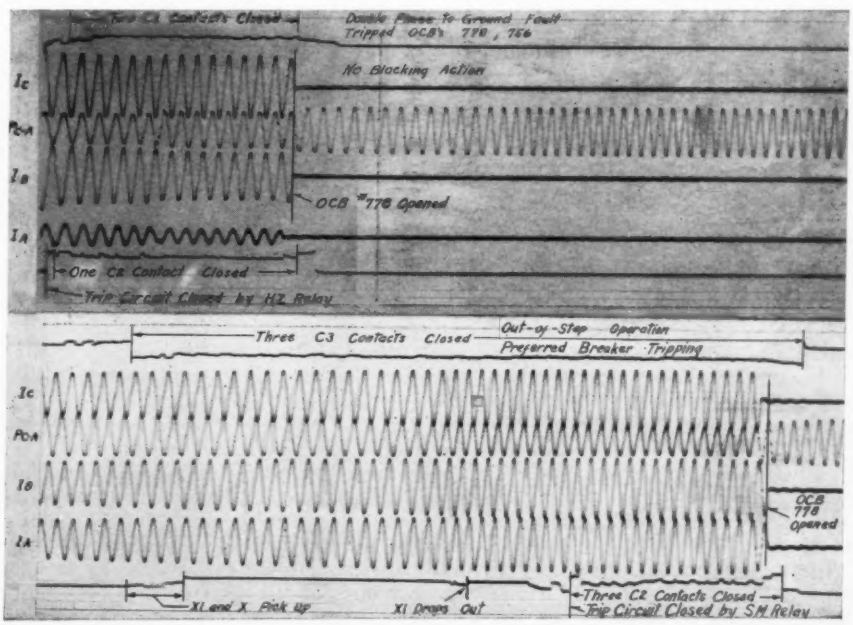


Fig. 3-a. Oscillogram showing double phase to ground line fault cleared by operation of instantaneous element of impedance line relay. Oscillograph located at Lake Charles. Ia, Ib, Ic are currents in phases A, B, C; Pc-a is potential phase C-A.

Fig. 3-b. Oscillogram showing out - of - step condition cleared by operation of blocking relays tripping preferred breaker at Lake Charles. Ia, Ib, Ic are currents in phases A, B, C; Pc-a is potential phase C-A.

Referring to the schematic diagram, Figure 2, the three C3 contacts close first, then an instant later the C2 break contacts open. The interval between is sufficient to energize the timing relays which pick up in the order X1, X. Contactor X2 then seals in around the C2 break contacts so that the latter, in opening an instant later, have no effect. In operating, X2 also alows X1 and X to be de-energized slowly and reset one after the other. The break contacts of X complete the opening of the trip circuit from the HZ relays and thus block any attempt to trip while X is in the operated position This timing interval — approximately one second—is sufficient to allow complete system separation by the preferred tripping breaker.

At the preferred tripping point, the relay action is the same as above up to the point where the C2 contactors operate. With the selector switch set for tripping, the C2 make contacts wil complete the circuit to the breaker trip coil, thus opening the breaker irrespective of the HZ relay directional or timer elements.

Line faults involving only two phases usually operate only one HZ relay and, therefore, cannot cause blocking action. A three phase fault within the second zone operates all three Z3 and Z2 contacts simultaneously. In this case the C2 contacts break at the same time the C3 contacts make so that there is still no blocking. A three phase fault beyond the second zone (backup protection) causes only the C3 contactors to operate and thus the blocking relays would open the trip circuit. However the blocking interval would be over in time to allow tripping on the HZ relay third zone timer contacts without additional time delay.

Oscillograph Records Obtained

Oscillograph records have been obtained of numerous transmission line faults and pull-outs with this blocking equipment in service. Figure 3-a shows a typical line fault cleared by the operation of the HZ impedance relay instantaneous elements. The double phase to ground fault caused only part of the SM relay elements to operate and there was no blocking action to delay tripping. The current shown is flowing from the Neches source through switch No. 778 into the fault between Lake Charles and Jennings.

Fig. 4. Installation of out-of-step blocking equipment for two oil circuit breakers (center section of left hand panel) with HZ impedance line and CR directional ground relays (top and middle section of center panel).

Oscillogram Figure 3-b shows the system pulling out of step slowly due to a disturbance external to this connecting line. The system was separated by the tripping of the preferred breaker (switch No. 778 at Lake Charles) and no intermediate station was interrupted. Notice that there is approximately one-half second between the operation of the three 3rd zone elements and the 2nd zone elements. Since preferred tripping is performed by the three C2 elements without waiting for the HZ relay timers, system separation was accomplished about 25 cycles (2nd zone timer setting) sooner than the time required by the impedance line relays by themselves. The blocking relays prevented any other circuit breakers from opening.

The conditions set up by various out-of-step operations may vary widely, especially when combinations of out-of-step and line faults occur. The blocking equipment can hardly be expected to function 100 per cent correctly in all cases so that adjustments are made to cover the normal operations most effectively. The point selected for preferred tripping is determined by the normal load power flow, and conveniences for reconnecting the two ends of the system after a separation. Conditions for fast preferred tripping are more favorable at stations near the middle of the connecting line.

During several months service, the blocking relays have been called upon to function several times and have effectively reduced the number of service interruptions due to pull-outs. Comparing the system performance with and without blocking equipment: before the installation, seventy per cent of such operations caused interruptions to one or more stations, while only eighteen per cent have caused interruptions since the blocking relays were put in service. In no case has the blocking equipment interfered with the clearing of line faults by the impedance or ground relays.

References

1. "A System Out of Step and Its Relay Requirements," by L. N. Crichton, Elec. Eng'g., Oct. 1937.

2. "Out-of-Step Blocking and Selective Tripping with Impedance Relays," by H. R. Vaughan and E. C. Sawyer, AIEE Paper 39-81.

Network System Operation Studied

A report on a-c network operation for the years 1936-1937 has just been released by the Transmission and Distribution Committee, of the Edison Electric Institute.

Sixty-nine companies operating 222 network areas in 121 cities or localities have submitted data which have been compiled and tabulated in this report for the period 1936-1937. These data have been analyzed, in general, on two bases, i.e., in relation to percent of total peak loal and percent of reporting localities.

The total peak load served by low voltage a-c networks in 1937 showed an increase of 37.6% over that reported for 1935. The total reported installed transformer capacity showed an increase of 27.4% for the same period, which results in a continuation of the improvement in load-transformer capacity ratio.

The allowable voltage variation at customers' services, when compared either on a total peak load basis or the total number of localities, indicates that either 73.1% or 58.7%, respectively, are operated at plus or minus 3 to 3.5%

(Continued on page 40)

New Instrument Facilitates Power Factor Surveys

WITHOUT extensive wiring, expensive equipment, or cutting into the line, the new General Electric portable varmeter permits quick determination of current up to 300 amperes, of line volts, and of reactive kva on power lines.

The new varmeter is simple to operate and a lineman can clamp the 12-pound instrument on the line, connect the voltage dividers, and obtain readings of volts, amperes and vars by the operation of a selector switch. Scale illumination assures accurate readings in poor light or at night.

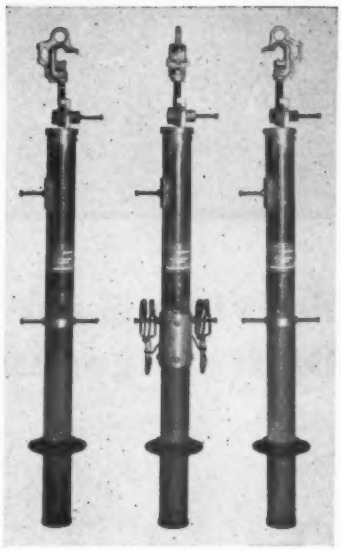
The instrument employs an electrostatic wattmeter element and measures vars (reactive volt-amperes) on a single-phase basis by indicating the product of amperes and volts, and the sine of the angle between these quantities. The jaws of a split-core transformer on top of the varmeter may be latched open, the instrument hung on the line, and the latch tripped with an insulated stick. This transformer supplies the element with a voltage proportional to the line current.

A self-contained lamp on the varmeter case provides illumination for a light index and the scale which is marked on a sheet of translucent compound.

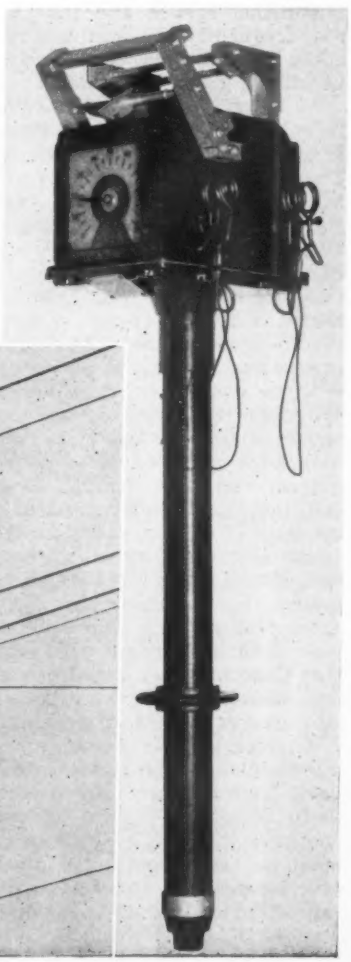
Voltage dividers, which are attached to the line by clamps, supply the definite fraction of line voltage. These dividers, two connected in series for single-phase, and three connected to form a Y box for three-wire, three-phase, consist of plastic tubes containing resistors, a small capacitor, and a neon lamp which glows when the dividers are energized. Connections are made with these dividers by flexible leads with spring connectors.

After connecting the varmeter and dividers to the line, a selector switch may be set at the end of the tube projecting from these instruments. After the range selector switch is set, an adjusting

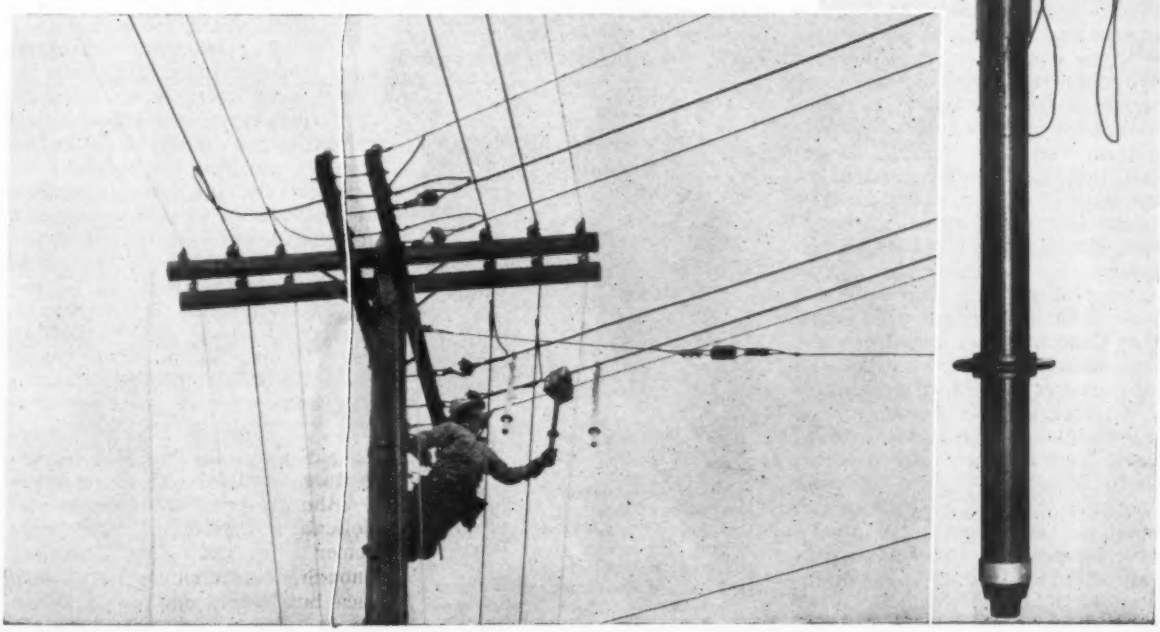
(*Continued on page* 41)



The voltage dividers shown above are attached to the line by means of clamps and supply the definite fraction of line voltage. Two are connected in series for single phase; three in Y for three-phase.



The new portable varmeter is shown below with split-core jaws open. Without extensive wiring it permits rapid measurement of current, voltage and reactive volt-amperes. Directly below, a lineman is shown making actual measurements with the instrument.



APPLIANCE Service

Servicing the "Low Side" Of Refrigeration Systems

By Allen Parker

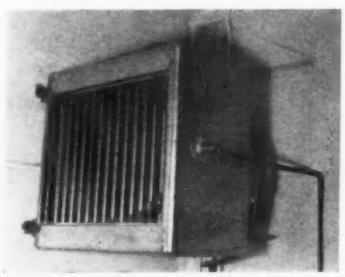
ONE of the most exasperating conditions that can face the service engineer is to encounter an installation where it is obvious that some trouble exists, even though all of the equipment apparently is functioning correctly. This situation is found especially in servicing the low side of a refrigeration system and the solution frequently can be found in a study of the load conditions to which the plant is subjected.

As an illustration, a customer recently complained of losing meat in his new heavy-duty display case designed especially for meat markets. In this instance, the specifications for the display case required that the cooling coil and compressor be balanced, that the coil and expansion valve be balanced, and that the proper size coil for the cooler be installed so as to guarantee a 36 degree Fahrenheit temperature. Such requirements are reasonable and logical and should assure correct operation.

In such an instance, some engineers might be inclined to install temporarily a recording thermometer in the case, and if it was found that the required temperature of 36 degrees was being maintained, they might let the matter drop, feeling that their job had been done. They might even doubt that there had been a loss of meat and would probably consider the customer as being just a crank.

Any service man handling such a complaint in that manner would be at fault for such cases do exist, and it is entirely possible that the customer was losing meat through spoilage even though the 36 degree temperature was being maintained. The trouble in such instances is usually found to be the result of too high relative humidity which causes the meat to get slick and slimy, in addition to "growing whiskers" from mould.

Now, perhaps the service engineer did not guarantee the humidity but it must be controlled to a certain extent if the equipment is to operate satisfactorily. In most cases, of course, the humidity takes care of itself, once the temperature is adjusted. As most service engineers know, the humidity is controlled by the temperature of the cooling coil, because the temperature of the cooling coil determines the amount of moisture removed from the surrounding air in the refrigerated compartment. When a fixture is "over coiled," that is, has too much cooling surface, there is a tendency to maintain the temperature of the fixture without lowering the temperature of the cooling coil very much, with the result that very little moisture will be removed from the surrounding air. Under such a condition, the relative humidity in the refrigerated compartment may approach nearly 100 per cent.



In this installation, the suction line is looped around several times behind the coil before passing through the compartment wall to the compressor. This eliminates the possibility of heat being transmitted through a short length of the suction line, affecting the control bulb of the expansion valve and resulting in improper operation.

Perhaps the suggestion that too much coil surface may be installed contradicts the thoughts of many service engineers because it is a common belief that the more coil capacity installed, the more practical will be the refrigeration job. And this belief is correct, if temperature alone is being considered.

Then too, there is ample justification for many service men leaning toward the "over coiling" tendency after many years of experience with jobs in which not enough cooling surface was provided. These "under coiled" jobs caused the coils to run at a lower temperature in order to maintain the fixture temperature with the result that the coil frosted too quickly, lowering its efficiency, causing long running periods of the condensing unit, and requiring frequent defrosting operations. Such jobs also caused meats and other perishables to be dehydrated which meant a heavy loss in weight, reduced profits; and caused bad discoloration of the meat.

All of these considerations indicate that correct operation is obtained only when a job has neither too much nor too little coil surface. Even though a new installation may be carefully figured and installed, operating problems may arise because of changes in load conditions after the unit has been in operation for a while.

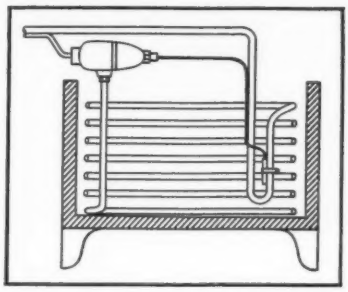
In recent years, some manufacturers of refrigerated fixtures have installed the cooling coils in their boxes or cases at the factory, thereby relieving the dealer of the responsibility of determining and installing the correct coil. Undoubtedly, this was a good move and it certainly must have reduced trouble from over coiling and under coiling. On the other hand, operating complaints will be received even from equipment of this type when load conditions vary to any great extent from those for which the equipment is designed.

As an example, a small heavy-duty display case was sold recently to a small neighborhood store for the preservation of meats and delicatessen products. This customer did not have business enough to warrent a heavy-duty case but bought one purely in an-

ticipation of his future business. With a condensing unit of adequate capacity, the temperature in the case was maintained at the desired value although the temperature of the cooling coil dropped hardly enough to form a frost on them. What frost did form, melted off quickly during cycles, and the differential of the cycles was far enough apart so that the machine operated very little. Here was what appeared to be an ideal installation: sufficient capacity with very little running time, clean coils with no frost forming on them, and a constant temperature of 36 degrees F., yet the meat was moulding, discoloring and smelling bad.

At this point, we checked the relative humidity and found it at almost 100 per cent. The heavy-duty case with over coiling was not practicable for the light load to which it was subjected. In this case, the remedy was to reduce the size of the coil, so that we could operate it at a lower temperature (below freezing) and yet maintain the same average temperature in the case. We accomplished this by removing the thermostatic expansion valve control bulb from the proper place at the "tail end" of the coil and fastened it to one of the return bends almost half way up the coil. In reality, this eliminated from practical use that part of the coil below the control bulb, since the control bulb was adjusted so as to maintain a difference in temperature of 10 degrees super heat between the expansion valve and itself.

This arrangement made the first part of the coil take the entire load which necessarily resulted in a lower coil temperature and thus provided some dehumidification in the case even though the same average temperature was maintained.



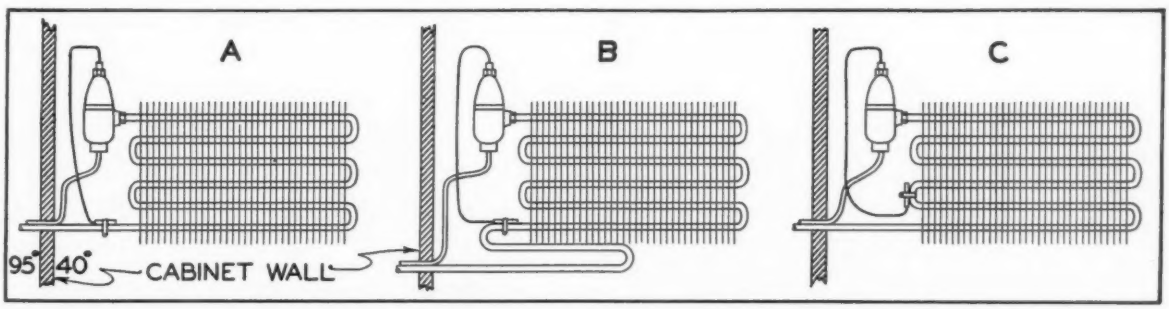
In connecting bath type jobs, it is important to remember that cold water below 39 degrees F. rises rather than sinks. For this reason, it is best to bring in the refrigerant at the bottom of the coil rather than at the top. To eliminate excessive ice formation at the bottom, loop the last turn of the suction line down to the bottom of the bath and install the expansion valve control bulb at this point.

Although it may seem unreasonable to many service engineers to think of the cooling coils as being a source of trouble, yet the above mentioned case is a typical example. Of course, the expansion valve should be selected to match the coil and many mistakes are made in choosing expansion valves. To use a valve with too small an orifice is likely to cause considerable trouble since the valve will be unable to supply the necessary refrigerant, yet to use one with too large an orifice may not give best results because its needle operation is confined to a few thousandths of an inch and inaccurate operation may result when the load is light. The latter condition may cause a surging and varying back pressure instead of a constant supply of liquid in the coils.

There is a tendency among most companies to standardize on the valve considered to be the "happy medium" and to rely on it rather than to build up a large inventory and supply a particular valve for each type of application. Incidentally, the surging conditions, when encountered, may be considerably improved simply by reducing the sensitivity of the control bulb. This can be accomplished by wrapping several layers of friction tape around a control bulb before strapping it to the end of the coil.

Since the introduction of the first dry coil equipped with thermostatic expansion for commercial purposes, there has been some doubt as to whether the expansion value should be installed, and the refrigerant supplied through, the top or the bottom of the coil. The early units were used with sulphur dioxide and it was considered proper to feed the refrigerant through the top of the coil in order to get a good oil return. However, with the introduction of Freon, there has been a tendency toward the bottom connection for the refrigerant supply, with the coil operated in a semiflooded condition. This is a good hook up, but unless there is some unusual reason for not making a top refrigerant connec-

(*Continued on page* 39)



In "A" above, a typical coil installation is shown. The control bulb of the expansion valve is fastened to the suction line just before it passes through the refrigerated compartment wall to the compressor. Much improper operation has been traced to heat transmitted from the outside of the refrigerator compartment through the short length of suction line, thus affecting the control bulb. A simple remedy for this difficulty is shown in "B" above. In this case a loop of two or three feet of suction line has been inserted between the end of the coil and the point where the suction line passes through the refrigerator compartment wall. Another solution is shown in "C" above. In this case the control bulb of the expansion valve has been moved to one of the return bends further up the coil. This method should be used only when it is evident that too much coil surface is available for proper humidity control. Moving the power bulb further up the coil makes that part of the coil below the bulb useless and requires that the effective part of the coil operate at a lower temperature in order to maintain the same average temperature in the compartment.

MOTOR Service

Connecting Diagrams for Lap Wound A-c Motors

Part 6

By A. C. Roe

Railway Motor Engineer
Westinghouse Electric & Mfg. Co.

THIS month the six pole, two parallel diagrams, Figs. 16, 17 and 18 are presented. These connections are arranged for single voltage or four and three leads. The discussion will center on how to check three phase windings and diagrams. A method of identifying phase coils will also be indicated.

With open slot stator windings, using insulated coils with leads all the same length, some coils require extra insulation across the ends or from slot to slot. These are termed phase coils, and one such coil is used both at the start and finish of each pole phase group. One method of identifying phase coils is to use a cotton finishing tape dyed red in contrast to white tape used on the plain coils. When this method is employed, a clear or amber baking varnish is used to treat the coils.

A partly wound stator is shown in Fig. C that has the phase coils marked with red tape. As can be seen this winding also has odd coil grouping, that is, 4-4-5-5-4-4, etc., and it is obviously a two-phase winding. The dark coils in Fig. C are the phase coils, and the light coils are the plain or standard insulated coils. Thus the use of red tape and clear varnish for open slot coils makes it easy to mark the pole phase groups as the stator is wound, and also results in simplified connecting. On the other hand, the use of phase coils and odd coil grouping necessitates the use of a good clear connecting diagram to start the winding and to refer to as the winding progresses.

In all the three phase connecting diagrams in this series the "all in" check is used, that is, the directional arrows on line leads A, B and C all point into the winding and the arrows on each adjacent group point in opposite directions, as in Figs. 17 and 18. In a star connection, the arrows all flow towards the star or center, whereas for a delta connection, the arrows indicate a flow around the triangle as indicated in the small schematic diagrams with each connection.

The "all in" check has no electrical or magnetic foundation but is used due to its being the most accurate and easiest check. The true electrical check would have two arrows pointing in and one pointing out on the line leads. In the line groups, there would be three groups together with the arrows pointing one way to form one pole. However, with this "two-in-and-one-out" check there is a possibility of error unless three checks are made, that is, each phase must be checked with the arrow pointing in.

It will be noticed that with the "all in" check, pole phase groups with a pitch of 3, or 1 and 4 apart, have the arrows pointing in opposite directions. As these are in the same phase, it forms the proper magnetic relations of opposite polarity.

It will prove interesting and instructive to make a four pole series star diagram and connect the wrong end of one phase to the star, and then make three checks with the "two-in-and-one-out" arrow method, and also one check with the "all in" method. It will be found that the "all in" check detects the error at once, while only one out of the three "two-in-and-one-out" method will locate the wrong connection.

In this discussion only the "all in" check will be considered, as it is the most practical and useful of the two and can be employed for both the d-c magnetic and mechanical check.

With the mechanical check, the directional arrows are applied pointing into the winding on all line leads. Also all arrows should point into the star connection. On delta connections at the junction of two line leads, one arrow should point into the phase with the line lead arrow and the other connection should have the arrow point out of the winding to the junction. (See Fig. 18 where the A and C leads connect to a common jumper, as indicated in the schematic sketch).

Next the directional arrows are placed on the pole phase group arcs. Group one should be selected and used for the "A" phase with the arrow pointing left to right, or clockwise, then mark each succeeding group with the arrows alternating in direction. Careful check must be made to assure that arrows alternate on all adjacent groups.

With "top-to-top-and-bottom-to-bottom" diagrams, it is the general practice to start a phase on the *top lead of a pole phase group*, which automatically spaces the starting groups 1 and 3 apart, so that the first and third group on

●

THIS is the sixth article in a series that will present 45 modern connecting diagrams for two- and three-phase lap wound induction motors for use on four-, six-, and eight-pole windings.

A master table of the 45 diagrams was presented in the July 1939 issue together with the first three diagrams of the series. Three additional diagrams have appeared in each succeeding issue.

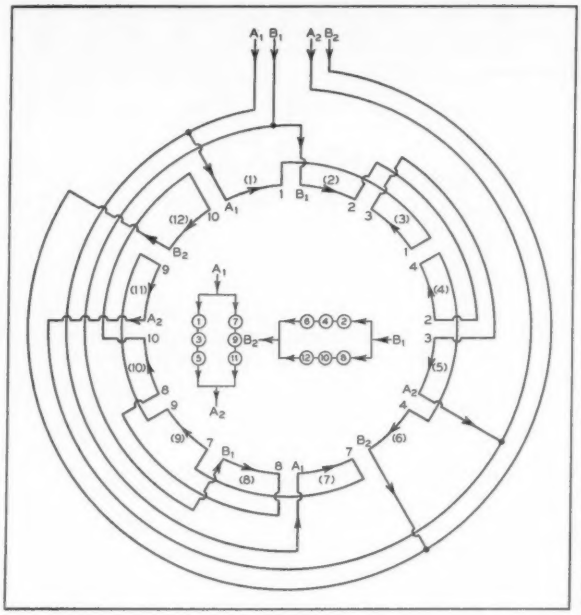


Fig. 16. Diagram for 6-pole, 2-phase, two-parallel connection.

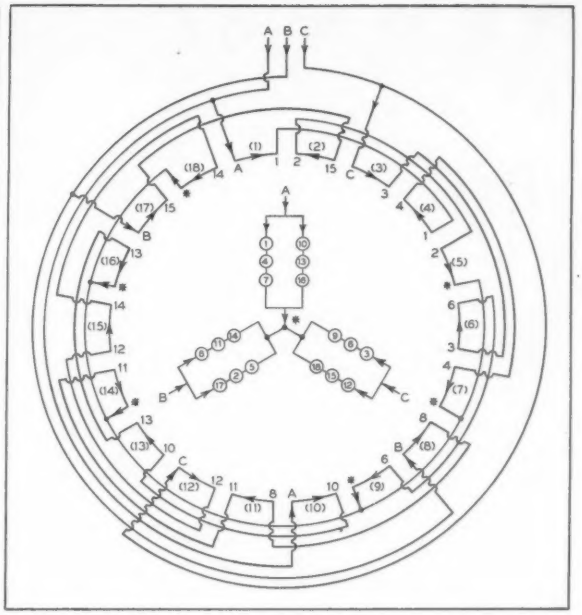


Fig. 17. Diagram for 6-pole, 3-phase, two-parallel star connection.

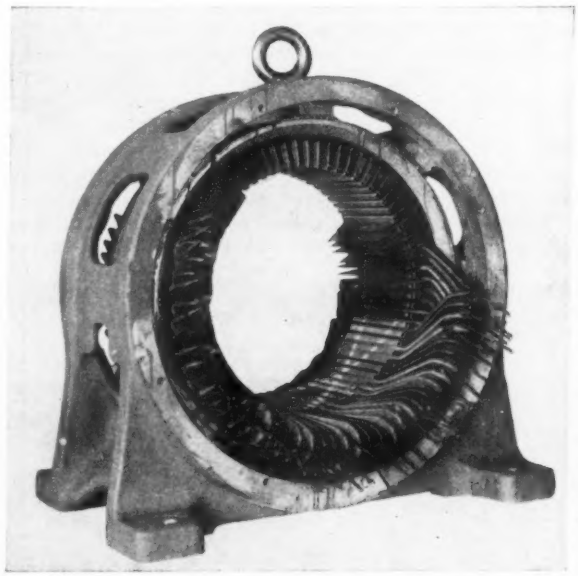


Fig. C. This partly wound stator illustrates how the use of dark tape for phase coils and white tape for standard coils permits ready identification of phase coils which require extra insulation across the ends.

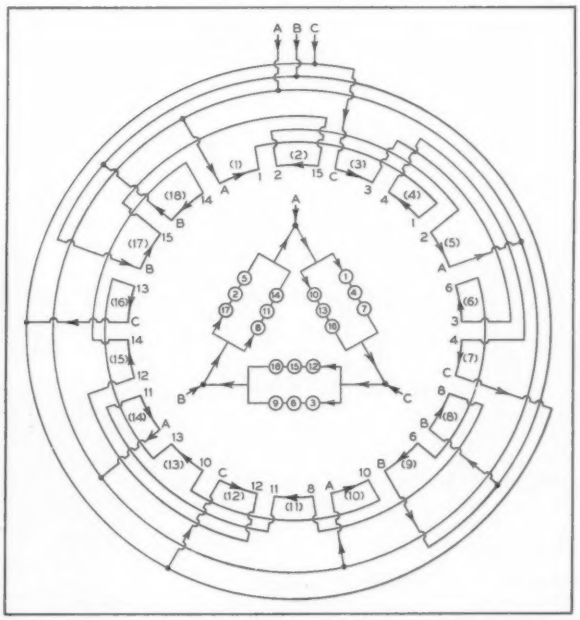


Fig. 18. Diagram for 6-pole, 3-phase, two-parallel delta connection.

each side of group one are selected as phase starting groups. The "A" phase will be in the center, the "B" phase to the left, and the "C" phase to the right. Any other combination will work, but the spacing 1 and 3 will hold, except on parallel connections that have as many legs as there are number of poles, such as a 6-pole six-parallel connection. In this case, each group has a start and finish of a phase and the arrow flow must follow the rules mentioned above.

With all groups marked, we start at group 1 and connect together groups 1 and 4 apart using jumpers. This will complete the arrow flow, that is, bottom to bottom or top to top, and we mark the end with a star or with the letter of the phase using the "A" phase junction. A small schematic diagram should be made first for delta connections so the common junction letters are known.

The next phase is started on a group pitch 1 and 3 either side of the group taken as the "A" phase starting point. Then groups 1 and 4 are picked up in the same direction as the first phase, or clock-

(*Continued on page* 40)

NEWS of the INDUSTRY

Dealers

Donald Duck Heads Water Heater Campaign

Selling electric water heaters in 1940 is going to be "duck soup" reports the Modern Kitchen Bureau. For the big push, the big campaign throughout the year, is to be captained by that public spirited citizen, that hero of the comics and silver screen, that tremendously influential maker of public opinion—Mr. Donald Duck, Esquire.

In its search for the best way to show prospects that the modern electric water heater is as clean, dependable, safe, and carefree as electric light, the Modern Kitchen Bureau found its answer in the appointment of a spokesman, popular with people everywhere, qualified to get attention and hold attention, and capable of influencing public opinion in the right direction.

So Donald Duck was drafted for the job. He will appear on window banners and counter cards, in newspaper and national magazine advertising, in plan books and direct mail folders, in his own personal jingle book, prepared for the guidance of salesmen and for the entertainment and education of folks to a good prospect for electric water heaters.

Appliance Sales Continue Upward Trend

Sale of domestic electric ranges during the month of September, 1939, in the sixteen southern and southwestern states totaled 7,458, an increase of 23 per cent over the 6,081 ranges sold in the month of August, according to reports of the statistical department, Edison Electric Institute. Sales for the first nine months of 1939 in the southern and southwestern states totaled 60,008.

Domestic electric range sales for the month of September, 1939, for the United States as a whole totaled 28,437, as compared with 26,441 for August, 1939, an increase of 7 per cent. Sales for the first nine months in the United States as a whole totaled 260,116.

Household model electric refrigerator sales increased during September, 1939, as compared to September, 1938, but were down considerably from the month of August, 1939.

Household model sales to the sixteen southern and southwestern states for September, 1939, totaled 15,082, as compared with 12,497 for the month of September, 1938, an increase of 20.5 per cent. Sales for the month of August, 1939, however, totaled 21,293. Household model electric refrigerator sales in the southern and southwestern states for the first nine months of 1939 totaled 387,001, as compared to 258,335 for the first nine months of 1938, an increase of 50 per cent.

Total sales for the United States for the month of September, 1939, amounted to 73,149, an increase of 18 per cent over the 62,148 recorded for the month of September, 1938. Sales in the month of August, 1939, however, totaled 94,734. Total sales for the United States during the first nine months of 1939 amounted to 1,746,355, as compared with 1,165,155 for the first nine months of 1938, an increase of 50 per cent.

Vacuum cleaner sales for 1939 passed the 1,000,000-mark in September, the total for the nine months reaching 1,000,251, compared to 940,409 in the same period of 1938, an increase of 6.3 per cent.

Sales in September exceeded those of September, 1938, by 18.3 per cent, totaling 120,708, compared to 102,014, and topping August sales of 96,601 units by 24.8 per cent, according to industry totals.

Household washers shipped in the first nine months of 1939 aggregated 1,110,166, according to industry totals reported by J. R. Bohnen, executive secretary-treasurer of the American Washer and Ironer Manufacturers' Association. This is an increase of 27.47 per cent over shipments totaling 870,901 reported for the same period in 1938.

September shipments were 138,992 compared to 125,821 in September, 1938, an increase of 10.47 per cent, and to 132,297 in August, 1939.

Ironer shipments for the three quarters were 82,219, against 82,581 in the same 1938 period. Ironers shipped in September aggregated 10,565, compared to 11,272 in September, 1938, and 11,386 in August, 1939.

Sales staff of Dodge Electric Company, Tulsa, Oklahoma, gets a lesson on the electric range. J. Alter, the company's livewire sales manager, stands in the center of the group. Salesmen trained in their jobs, plus Modern Kitchen Bureau Electric Range Program, will mean more range sales in Tulsa, this year.

New Firms, New Lines, and New Stores —

The Dacy Electric Company, located at 10 Wall Street, Asheville, N. C., for the past ten years, has just moved into their new home at 95 Patton Avenue, next door to the Carolina Power and Light Company's Asheville office. Kenneth Dacy, owner of the firm, reports that the move has been necessary because of continued increases in business since organization of the firm in 1927.

The Dacy Electric Company are dealers for the Kelvinator line of electrical appliances, Zenith radios, Estate oil heaters, and Peerless stokers. The company is also licensed for electrical contracting work anywhere within the state.

* * *

Posey Snow, of Winston-Salem, N. C., has opened an electrical repair shop in Lexington, N. C., to be known as the Snow Electrical Company. Mr. Snow will specialize in motor and armature rewinding.

* * *

General Appliance Company, Engineers, is the new name of the firm formerly known as the General Electric Machine & Supply Company, operating at 224 Hamilton Street, Houston, Texas. Headed by W. J. Smith, president, this firm will specialize particularly in motor rewinding and repairs.

* * *

Another important advance in the growth of Meyer's Department Store, Greensboro, N. C., was marked by the addition of the Major Appliance Annex, in a modern and attractive building adjacent to the main store on the corner of South Elm and West Sycamore Street. The new addition adds approximately 25,000 square feet of floor space.

Hugh L. Hayes, of Hattiesburg, Miss., has been appointed manager of Meyer's Major Appliance Division, according to announcement by J. T. Martin, president of the firm. Mr. Hayes has established an enviable record in the appliance sales field, having been connected with the Frigidaire Corporation in New Orleans as manager of the air conditioning division. He was also connected for a while with the Frigidaire division at Roanoke, Va. For two years he was associated in the business of Rawls and Jennings, at Charlotte, and later sold his interest in that business to take charge of the Frigidaire department of the Farrier Motor Company, of Hattiesburg and Laurel, Miss.

The Meyer's Major Appliance Annex will handle Frigidaire home appliances, Maytag and allied washers and ironers, Bendix home laundries and RCA and Aria radios.

Georgia Appliance Sales Well Ahead of 1938

Unit sales of popular electric appliances for the first nine months of 1939 are well ahead of sales for the same period of 1938, reports the Georgia Power Company. Of particular interest is the announcement that water heater sales for the first nine months of 1939 have totaled 1,428, as compared with 1,080 for the corresponding period in 1938. Substantial increases have also been noted in range, washer, space heater, hotplate, iron, heating pad, waffle iron, portable fan and ventilating fan sales.

Unit sales for popular appliances are given in the following tabulation:

Appliance	1939	1938
Ranges	2,003	1,784
Refrigerators	3,054	3,214
Water Heaters	1,428	1,080
Washers	721	644
Ironers	105	112
Mazda Lamps	360,494	366,801
Portable Lamps	7,380	8,071
Cleaners	407	640
Health Lamps	60	47
Water Pumps	227	262
Space Heaters	470	361
Grills, Hot Plates	809	773
Hand Irons	11,691	10,105
Heating Pads	1,095	669
Percolators	2,470	2,843
Toasters	1,158	1,958
Waffle Irons	1,496	1,390
Roasters, Cookers	297	524
Ventilating Fans	510	265
Portable Fans	3.811	3,360

Meter Payment Plan Applied to Range Sales

The meter plan of payment has been extended to electric ranges in an interesting experiment of the Pizitz Department Store of Birmingham. Deposits by the customer range from 15 cents a day up according to the size and price of the range.

"We had such good results with the meter plan of selling electric refrigerators, that we decided to extend the plan to ranges and obtained the cooperation of General Motors Corporation in doing so," said W. C. Allen, manager of the appliance department. "We don't know how it will work out yet, but can see no reason why it will fail based on our experience with refrigerators."

The store is just as careful as to the credit rating of those purchasing on the meter plan as on any other, hence credit losses have been almost nil. In fact, Mr. Allen stated monthly payments on the meter plan often run more than on merchandise sold with a down payment. A person buying on the meter plan can switch over to a different plan if he desires.

Contractors

Southern Regional Wiring Conference

Arrangements have been made to hold a Southern Regional Wiring Conference in New Orleans on Thursday and Friday, December 7 and 8. This conference will be conducted along the lines which were followed in the San Francisco, Chicago and Pittsburgh meetings and which were found so productive by the many industry leaders who attended them. North and South Carolina, Georgia, Alabama, Mississippi, Louisiana, Arkansas, Kansas, Oklahoma, Texas, Florida and Tennessee are being drawn on for the attendance.

The conference will be sponsored by the National Adequate Wiring Bureau and the local arrangements will be handled by the Electrical Association of New Orleans. The business sessions will be held in the Roosevelt Hotel which will also be official hotel headquarters for the delegates.

The subjects to be discussed will include the promotion of adequate wiring in new home construction and in existing homes through industry cooperation; through utility promotion and service; through general promotion and service contacts; through the certification plan; and through the use of National Bureau service.

Some of the most effective adequate wiring promotions have been conducted in the Southern states and leaders from key centers will be selected to guide the discussions. These will include representatives from Dallas, Pine Bluff, Beaumont, Chattanooga, Birmingham, Oklahoma City, Charlotte and other points.

The conference is open to all who have an interest in the industry's job of promoting the installation of adequate wiring in homes as a service to the public.

Wiring Certificates Awarded in Charlotte

Eleven homes in a new residential development will be awarded adequate wiring certificates by the local Bureau at Charlotte, N. C. The first six to be completed

were recently opened for public inspection and full page newspaper advertisements of John Crosland Company, builder, emphasized the importance of certified adequate wiring.

Charles B. Miller, Jr., of the Duke Power Company, states that this project of the local bureau was certified on their 1 per cent plan through which advertising in that amount of the selling price of the home is offered provided the wiring installation meets the proper standard.

"The fact that these homes are in the so-called lower price bracket proves that adequate wiring is practical in this market," said Mr. Miller. "We firmly believe that some of the seeds of publicity we have sown are beginning to take root. We are constantly getting more cooperation from architects, and, in a few cases where we were not able to bring plans up to adequacy standards, architects and builders have put in better wiring. We know that this has been the result of our adequate wiring activity."

Jacksonville Association Becomes N.E.C.A. Chapter

The Jacksonville Electrical Contractors Association, which has been a very active organization for a number of years, has been chartered as a non-profit Florida corporation and becomes the Jacksonville Chapter of the National Electrical Contractors Association. The charter was officially filed November 1.

Officers of the Chapter are: W. O. Henderson, president; Rudy Baache, vice president; L. L. Hunt, secretary; S. C. Reddick, treasurer; and members of the board of directors, D. L. Carroll, C. R. Levell, and H. A. Sonnenberg.

Miller Awarded Memphis System "Tying-In" Contract

Consolidation of Memphis' dual electrical distribution systems is a step nearer as the result of another "tying-in" contract awarded recently by the Board of Light, Gas and Water Commissioners to the Miller Electric Co., of Jacksonville, Fla. Cost of the project will be about $254,000.

Before the city and TVA purchased the gas and electric properties of the Memphis Power & Light Co., a competing system was under construction by the city. Since the purchase, engineers have been joining the two systems. Several months longer will be required before consolidation will be complete.

Interest Maintained In Adequate Wiring

Definite increase in interest among home builders and home owners in adequate wiring and tangible results from this interest are evident in New Orleans as a result of an intensified campaign toward this end conducted by the Electrical Association at New Orleans.

Two demonstration homes were sponsored by the Association into which wiring and the "five steps to better living" were introduced. These were visited by thousands of home owners, being priced in the $5,000 and $10,000 classes and therefore appealing to a wide variety of prospective home owners.

These homes were equipped with complete electric kitchens, including metal cabinets, and were sold in short order. The lower-priced home was located between two other new homes recently completed. The builder of these homes, watching the crowds visit the adequately-wired home, immediately contracted to have his buildings wired in that manner and these likewise were sold in a few days.

Adequate wiring also has been stressed by builders in many other residences constructed during the summer and this was made a principal selling point. The New Orleans Public Service, Inc., maintained an offer to pay or aid in paying for advertising where electrical equipment was emphasized.

Supervision Offered

The Electrical Association had a standing offer to supervise all installation for wiring adequacy and reported a fair number of homes have been supervised, although figures for these have not been compiled.

Members of the Association believe that the campaign of the year, on which the organization centered its activities, has borne fruit in not only greater interest in better electrical installation and fixtures, but in the actual translation of this interest into installation of adequate wiring and equipment in homes built during the year.

Utilities

Vapor Lamp Power Factor Improvement Mandatory

The Oklahoma Corporation Commission, November 10, issued Order No. 13,336 finding that neon, mercury and other gaseous tube lamps possess the characteristic of low power factor, and ordering the installation by customers of capacitors.

The new rule, promulgated by the commission order, reads:

"In the case of neon lamps, mercury vapor lamps and other gaseous tube lamps or lighting devices, having low power factor, the company will require the customer to provide at his own expense, power factor corrective equipment which will maintain the power factor of each such device at not less than ninety per cent. In the event the customer will assess an annual charge, payable monthly, in such an amount as will compensate for the difference between serving fully corrected equipment and uncorrected equipment of like size and character, such charge to be applied against all uncorrected installations made after the 19th day of November, 1939, and to all existing installations, when the same are reconstructed, materially altered or moved to a new location."

Reciting its reasons for the order, the corporation commissions stated that, while this type of lighting is recognized as highly efficient in respect to lighting qualities and economical operation, the utility must furnish more current than will register on the kilowatt-hour meter. This excess wattless current in the consumer's circuit and the utility's system, in many cases, would cause overloading and overheating of the lines. This condition can be cured by installing capacitors when the lighting system itself is installed, without increasing the amount of energy consumed by the light user.

Construction Work Begun On Santee-Cooper Project

The South Carolina Public Service Authority opened bids November 28 for power plant, lock gates, machinery and steel work construction and installation on the

Santee-Cooper project. The authority had previously notified Wilbanks & Pierce, Inc., Bradenton, Fla., to start work on its contract on the north dam and river closure for the Santee reservoir.

The Wilbanks & Pierce contract is for $2,420,265. The work when completed will divert a part of the Santee river flow into the upper reservoir, thence through the diversion canal into the lower reservoir, formed by the Pinopolis dam. The fall from the Pinopolis reservoir to the Cooper river will be through the lock at Pinopolis and the power-generating plant for which the additional bids were opened November 28.

New Orleans Utility Executive Honored

Two signal honors were accorded Harold E. Meade, of New Orleans Public Service, Inc., in November. Closely following his elevation to the position of vice president earlier in the month, Mr. Meade was presented with the McGraw Award Medal for Cooperation at a dinner sponsored by the electrical industry of New Orleans on November 15.

The presentation was made by Earl Whitehorne, editor, *Electrical Contracting*, "in recognition of his constructive contribution to the

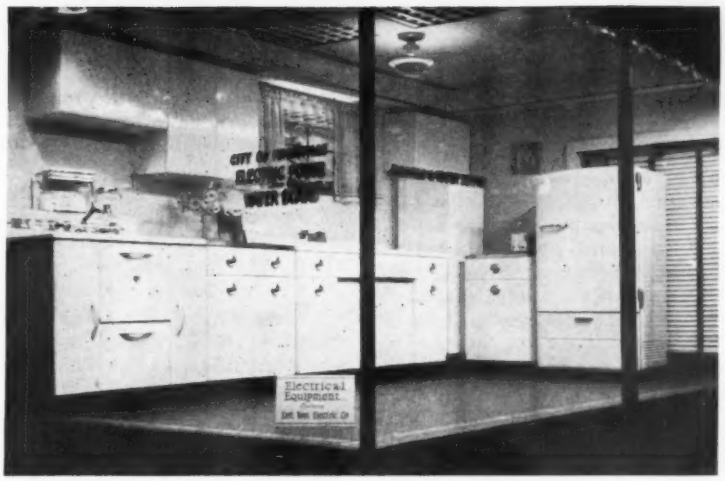
H. E. Meade

advancement of cooperation in the electrical industry, through the development of a program for the education of dealers' sales people in New Orleans. Beginning with the promotion of lamps and lighting equipment, it now embraces domestic and industrial sales and has become the impulse of a nationwide sales training program, benefiting dealers, wholesalers and manufacturers."

The citation accompanying the award points out that Mr. Meade conceived the idea some years ago that progress in the development of the local market for electricity is dependent basically upon the knowledge and skill of the wholesale and retail electrical sales people of the community. As general sales manager for the New Orleans power company, he proceeded to develop this theory by encouraging, guiding and later organizing a cooperative program for the schooling of the salesmen employed by wholesalers, contractors and dealers of New Orleans.

The citation also points out that the achievement is the more notable by the fact that it also has constituted an effective demonstration in New Orleans of the practical benefits of good business ethics. For starting in an atmosphere of indifference and suspicion toward cooperative market development, the establishment and maintenance of frank policies of fair dealing between competitors has proved the creative power of team work and produced a new enthusiasm that has definitely advanced both the technique and spirit of marketing within the electrical community.

The committee of judges which awarded the medal to Mr. Meade consisted of B. W. Clark, president, Westinghouse Electrical Supply Co., New York; D. Hayes Murphy, president of The Wiremold Co., Hartford; S. J. O'Brien, president of S. J. O'Brien, Inc., New York; and P. H. Powers, vice president, West Penn Power Co.



Although the city electric department of Knoxville will not actually sell any appliance merchandise, a sales promotion department will endeavor to boost dealer sales. Show windows in the electric department building will feature displays by various local dealers. The all-electric kitchen shown here was displayed for the East Tennessee Electric Co.

G-E Home Bureau Executive Addresses Atlanta Meeting

More than two hundred operative builders, electrical contractors, architects, real estate men, representatives of the F.H.A., and others, were guests of the Georgia Power Company at a dinner meeting November 13, which featured an address by A. J. Brock, of the Home Bureau Division of the General Electric Company.

Mr. Brock came to Atlanta from St. Louis, where he has been connected with several large-scale home developments in Texas, California, Missouri and other states. While the principal theme of his address was the construction and sales of homes from a merchandising viewpoint, he devoted a considerable part of his talk to the value of adequate wiring and all-electric kitchens and their value in merchandising homes.

Jackson P. Dick, Atlanta division manager for Georgia Power Company, presided over the meeting.

New High Voltage Line To Be Constructed by TVA

The Tennessee Valley Authority announced recently that it had approved construction of 154,000 volt line connecting the Hiwassee and the Chickamauga Dams. The cost of the line and terminal facilities at Chickamauga is estimated at $813,000. The line will provide for delivery of power generated at Hiwassee Dam to the TVA system.

News About People—

E. E. Hunter, superintendent of generation of the Oklahoma Gas and Electric Co., Oklahoma City, was guest of honor at the company's annual party at the Shrine auditorium in Oklahoma City, when service pins were awarded to 184 employees who have been with the company from 5 to 35 years.

Mr. Hunter was awarded his service pin for 35 years of service. Employees awarded 30-year pins were H. A. Brochardt, superintendent of insurance; and H. A. Olson, of the accounting department. The 25-year men are Leo Valentine, superintendent of the Oklahoma City district; Roy N. Mauk, reclamation department; Frank J. Koontz, transmission and distribution department; and F. C. Miller and William L. Royse, both of the service department.

* * *

Three veteran employees of New Orleans Public Service, Inc., were elevated to position of vice president according to announcement made by A. B. Paterson, president, on November 8. The men are E. S. Myers, H. E. Meade, and A. B. McCoard. At the same time, Mr. Paterson announced that Paul Hoots, of the engineering department, has been made assistant to the president.

Mr. Myers has been with the utility company since 1922 and formerly was manager of a company at Vicksburg, Miss. Mr. Meade has been associated with the company since completing studies at Tulane University in 1923. Mr. McCoard is the veteran of the three, having started as office boy with the company in 1903.

* * *

Roy E. Sivley, manager commercial department, San Antonio Public Service Co., and Jack Mitchell, of radio station *KTSA*, have principal parts in a series of dialogues sponsored by the San Antonio Advertising Club as an entertaining and effective means of bringing the importance of the various phases of advertising before the membership. Mr. Sivley plays the part of a modern business man, while Mr. Mitchell takes the part of a salesman. Mr. Sivley was recently elected vice president of the club.

* * *

T. D. Ector, manager of the Florence district of the Carolina Power & Light Company for the last 10 years, has been made manager of the southern division of the company which includes all Carolina Power & Light property in South Carolina.

Mr. Ector will have his headquarters in Florence.

P. L. Cashwell, of Zeppelin, N. C., will come to Florence to serve as assistant manager of the Florence district.

* * *

Formal approval of the employment of S. R. Finley, as general superintendent of the Chattanooga Electric System, was completed at a recent meeting of Chattanooga Electric Power Board.

Other appointments approved at the meeting included those of N. J. Simmons, secretary; C. Wright, general accountant; E. R. Cullis, customer accountant; C. B. Osborne, sales promotion manager; Ken Whitaker, purchasing agent and personnel director; C. E. Simpson, office engineer in charge of budget and statistics; and George B. Barnett, assistant purchasing agent.

* * *

E. W. Ashmead, formerly sales manager of the Tennessee Electric Power Company, returned to the Alabama Power Company as assistant to James M. Barry, vice president and general manager.

Mr. Ashmead was first associated with the Alabama Power Company in 1917 as local superintendent at Anniston. He held various other positions with the company and later became assistant commercial manager.

Shortly after the organization of the Commonwealth and Southern Corporation, Mr. Ashmead became assistant to the vice president of that company, which position he held until he was made manager of sales of Tennessee Electric Power Company in 1934.

Wholesalers

E. A. Hawkins Appointed Graybar Vice-President

At a meeting of the board of directors of Graybar Electric Company, Inc., held in September, E. A. Hawkins was elected vice-president. Less than two months ago, Mr. Hawkins, who had been assistant general sales manager since 1933, was made general sales manager.

Mr. Hawkins first became associated with the company in 1899, the year he received his M.E. from Cornell University. When the supply division of Western Electric became the Graybar Electric Company in 1926, he was made general supply sales manager in the new organization.

Smith Heads New Westinghouse Branch

J. R. Smith has been appointed manager for the Westinghouse Electric Supply Company at Charlotte following the establishment of this office as an independent branch. Up to the present time the Carolina territory has been operated under the division plan with four houses. Because of the increasing importance of the Charlotte trading area, it was found necessary to operate the Charlotte business as a separate branch.

Mr. Smith is widely known throughout the South. A graduate of Auburn University, he first became associated with the company in 1934 and since that time has specialized in rural electrification.

Announcement was made at the same time that F. P. Larson, a resident of Charlotte for many years, has been appointed office manager of the Charlotte branch.

* * *

J. A. Creech is now representing the Tower-Binford Electric & Manufacturing Company, of Richmond, in eastern North Carolina and the border of South Carolina, according to announcement by A. C. Burke, sales manager. Mr. Creech has been connected with the Carolina Power and Light Company, of Raleigh, for several years, and more recently, he has been associated with the Griffin

Appliance Company at Lumberton, N. C.

* * *

Newest addition to the electrical sales force of Moore-Handley Hardware Company, of Birmingham, is W. C. Sparks. Mr. Sparks joined the company in 1936 and served successively as stock clerk, office order clerk, and office salesman.

Well-Known Wholesale Executive Dies

Herbert Bryce Parker, sales manager, Norge Southwest Sales Company, of San Antonio, Texas, and well known among the retail and wholesale trades throughout the southwest, died at his home in that city, Nov. 11. Death was attributed to a heart attack.

Mr. Parker had been associated with Norge sales in San Antonio for a number of years and played an important part in the development of these products in San Antonio and the surrounding trade territory.

G-E Wiring Materials Distributor Announced

The Henry A. Petter Supply Co., 117 South First St., Paducah, Kentucky, has been appointed a distributor for wiring materials, Deltabeston wires and cables, insulating materials, and automotive products of the General Electric appliance and merchandise department.

Inspectors

Adequate Wiring Discussed By Virginia Inspectors

"Safety and Economy by Means of Adequate Wiring" was the theme which ran through all speeches delivered at the meeting of the Virginia Chapter, International Association of Electrical Inspectors, in Alexandria in mid-November. Safety, it was outlined, is achieved by sufficient wiring and material, and economy by standardization of installations and the elimination of costly future changes. Dr. Morton G. Lloyd of Washington, D. C., president of the organization, also stressed the advantages to both public and trade of the proposed changes in the code to become effective in 1940.

Speakers included E. T. Moore, "Making Electricity Safe"; M. J. O'Connell, president Virginia Public Service Co.; Victor H. Tousley, "Electrical Fires and their Causes"; Henry J. Morton, Edison Electric Institute, who spoke on the institute's code proposals; H. N. Pye, Chief engineer, Southeastern Underwriters Association; W. E. Armstrong, Underwriters' Laboratories, Inc.; O. K. Coleman, American Gas & Electric Co.; C. H. Dougherty; J. S. Zebley, Chief Electrical Inspector, Washington, D. C., "Necessity for Better Protection on Commercial Refrigerator Motors and Equipment"; Arthur L. Abbott, N.E.M.A., "Design and Installation of Motor Wiring and Equipment"; J. M. Murphy, city electrical inspector, Roanoke, Va.; J. Warren Pyles, R.E.A.; T. W. Bowry, city electrical inspector, Richmond, Va., "Sales Control."

Southern Section Drive For Membership Continues

The membership drive of the Southern Section, International Association of Electrical Inspectors, begun in September, is producing substantial results, according to announcement by Joseph Whitner, secretary-treasurer of the section.

Members who have submitted and endorsed new member applications since the drive began in September are as follows:

W. E. Armstrong, New York, N. Y.—1
T. W. Bowry, Richmond, Va.—1
T. P. Branch, Atlanta, Ga.—3
Claude V. Bulls, Norfolk, Va.—2
N. E. Cannady, Raleigh, N. C.—1
H. G. Knoderer, Bridgeport, Conn.—1
G. M. Miller, Richmond, Va.—4
J. Warner Pyles, Washington, D. C.—2
B. Z. Segall, New Orleans, La.—2
W. R. Taylor, Jr., Atlanta, Ga.—1
Joseph Whitner, Atlanta, Ga.—2
W. Edward Dunn, Alexandria, Va.—1
C. S. Whitaker, Durham, N. C.—1
L. S. Pockrun, Tyler, Tex.—1
Frank Camus, Shreveport, La.—1
Chas. S. Zimmer, Houston, Tex.—1
A. J. Bommer, Dallas, Tex.—3
A. E. Hancock, Austin, Tex.—1
R. B. Hendricks, Llano, Tex.—5

Readers interested in obtaining information in regard to membership in the I.A.E.I. may obtain full particulars by writing Joseph Whitner, Secretary-Treasurer, P. O. Box 1743, Atlanta, Ga.

Associations

Two-Day Austin Meeting Held by Southwestern IES

The fall meeting of the Southwestern Chapter, Illuminating Engineering Society, was held in Austin, Texas, October 27 and 28. The various sessions were held in different buildings on the campus of the University of Texas, that on Friday morning being in the Engineering Building. Guy G. Griffin, Dallas, chairman of the Chapter, presided at the Friday morning session; and F. Y. Brightman, of Houston, vice chairman, was in charge of the Friday afternoon session, which was held in the auditorium of the Architectural Building.

The principal address at this session was on Modern Photometry, by C. R. Granberry, professor of electrical engineering, University of Texas. This was a presentation of color classifications and included discussion and laboratory demonstration of the testing of lighting equipment, including the making of distribution curves, brightness measurements and other lighting essentials. Following this talk there was a tour of the college laboratories.

Speakers in the afternoon session included R. W. Warner, professor of electrical engineering at the University; Walter T. Rolfe, chairman, Department of Architecture at the University; Paul Barker, State Department of Health; L. L. Fouraker, Texas A. & M. College; and R. L. Knapp, of Dallas Power & Light Company.

The high spot of this session was the talk by Mr. Rolfe on "Illumination and Materials." His talk traced lighting back to the time of the primitive man and carried it through to the current time, with glimpses of future possibilities.

A feature of the afternoon session was a recess for examination of the Beaux-Arts competition drawings, which were on hand for the benefit of the visitors.

A session was held Friday evening in the English Room of the Texas Union, at which the principal speaker was A. D. Cameron, national vice president of the I.E.S., and vice president of the Holophane

(Continued on page 39)

MANUFACTURERS' News

New Executives Elected For General Electric Co.

Charles E. Wilson, executive vice president of General Electric Company was elected president, and Philip D. Reed, formerly assistant to the president, was elected chairman of the board of directors of the General Electric Company at a meeting of the directors held in New York City, November 17. Both men will take over their new responsibilities on January 1.

C. E. Wilson

Phillip D. Reed

The two men succeed Gerard Swope and Owen D. Young, who will become honorary president and honorary chairman of the board, respectively. Both Mr. Swope and Mr. Young have served in their present capacities since 1922. They both held the view that the morale and effectiveness of the organization would be greatly improved if, as a general rule, men in important administrative positions would consider retirement when they reached the age of 65.

In a letter to the board of directors signed jointly, they said, "Having adopted that policy of retirement during our administration, we now apply it to ourselves. We do so with no reservation because there are younger men, whose experience and capacity have been demonstrated to you, who are now available for those offices."

Mr. Wilson began his career in business as an office boy at the age of 13 with the Sprague Electric Company, a former constituent company of General Electric. He served the General Electric Co. in many capacities up to 1930, when he was appointed manager of the merchandise department in charge of engineering, manufacturing and sales. During the same year, he was elected a vice president of the company. In 1937, he was appointed to the newly created position of executive vice president.

Mr. Reed, the new chairman of the board, first joined the General Electric Company in its law department in 1926, just one day before his twenty-seventh birthday. He holds degrees both in electrical engineering and law. In 1928 he was transferred to the incandescent lamp department, and from July 1, 1934, until his appointment as assistant to the president in December, 1937, he was general counsel for the lamp department.

W. M. Gallant Honored By Westinghouse Co.

Unusual recognition was accorded Wade M. Gallant, manager of the Raleigh, N. C., office of the Westinghouse Electric and Manufacturing Co., when he received the highly prized Westinghouse Order of Merit. The company's board of directors made the award in recognition of his exceptional work in eastern North Carolina since 1910. The actual presentation of the award was made by Ralph Kelly, vice president in charge of sales, and Thomas Fuller, southeastern district manager, at a special gathering of fellow employees held recently at the Southeastern district headquarters in Atlanta.

Mr. Gallant's first contact with Westinghouse came in 1906, when Mr. Fuller, manager at that time of the Charlotte office of the company, sold the city of Gastonia, N. C., a radically new type of lighting equipment. To assure the successful operation of this new development, C. E. Stephens, who is now vice president of the Westinghouse Company, but who at that time was working as an engineer and had designed the new lamp, visited Gastonia and worked for several weeks on the installation and operation of the new lighting system. He and Mr. Gallant became very close friends.

As a result of this close association with Westinghouse men of that period, Mr. Gallant joined the Westinghouse Company in 1908 and went to the Newark plant as an apprentice. Later he was transferred to the East Pittsurgh Works, where he became an engineering apprentice, and where he attended night school at the Carnegie Institute of Technology, studying electrical engineering.

In 1910 he was transferred from

Wade M. Gallant, manager of the Raleigh, North Carolina, office of Westinghouse, recently received the highly prized Westinghouse Order of Merit in recognition of his exceptional work in eastern North Carolina. Presentation was made by Ralph Kelly, vice president in charge of sales, at a meeting of fellow employees at the Southeastern District headquarters, Atlanta. Left to right are Mr. Kelly, Thomas Fuller, Southeastern District manager, and Mr. Gallant.

East Pittsburgh to the Westinghouse offices in Charlotte. His first assignment was to serve the industry in eastern North Carolina and it is for his exceptional work in this one section since that early date in 1910 that Mr. Gallant was voted to receive this Westinghouse Order of Merit by the board of directors.

Business Improvements Are Announced

Announced recently by Frank A. Ketcham, president of Graybar Electric Company, national electrical distributors, was the restoration of salary reductions and the lump sum payment up to date of the entire reduction so far this year.

"Improved general business conditions and the increased demand for electrical products enables us to take this step," said President Ketcham. "We are looking forward with confidence to a profitable 1940 and believe that as an employee-owned concern we should share these profits with our employees through this salary restoration."

* * *

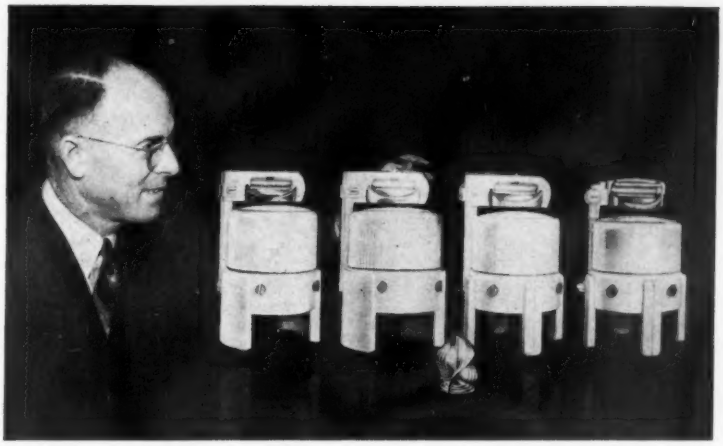
According to figures just released by Howard E. Blood, president, Norge Division Borg-Warner Corporation, 21,259 Norge products were shipped to Norge distributors in October representing an increase of 48.3% over shipments in October, 1938. Largest gains were recorded in shipments of refrigerators and space heaters. Refrigerator shipments during October, 1939, were 83.4% greater than those for the corresponding month of 1938. Space heater shipments increased 103.8%.

* * *

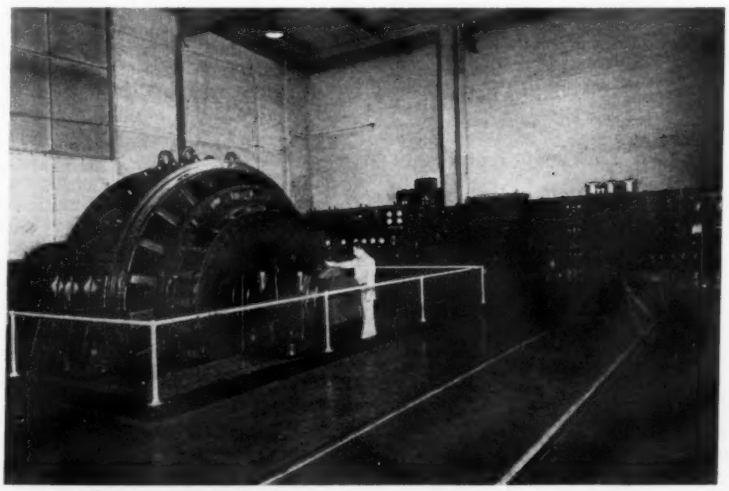
Coinciding with the declaration of a dividend of 75 cents per share on the common stock and 87½ cents per share on the preferred stock, A. W. Robertson, chairman of the board, Westinghouse Electric and Manufacturing Company, issued a statement declaring that the business of the company is considerably better now than it was last year, or any year since the beginning of the depression, except for a short spurt in 1937.

The company reported that orders booked for the first nine months of 1939 were $153,976,777, as compared with $113,170,228 for the same period in 1938, an increase of 36%.

In commenting upon the improvement in business, Mr. Robertson said, "We have reason to think that most of this improvement in business is not due to war or the stimulation of war, but to sound, steady recovery in the country's economy."



To Fred Stephens, Apex advertising manager, goes the credit for the solution of a difficult sales problem. Shown here are his miniatures of the Apex washing machine line which are small enough to fit nicely into the ordinary brief case. Apex wholesalers throughout the entire organization are using the miniatures and it is reported that many Apex retail salesmen are finding them a valuable means of gaining attention when calling on washing machine prospects in the home. The miniatures are surprisingly accurate in detail. They are enclosed in a waterproof envelope and sell for 22 cents for a set of four.



Shown here is the motor room and the 7500 hp blooming mill drive at Republic Steel Corporation's Gadsden, Ala., plant. Since Republic Steel Corporation acquired the Gulf States Steel Company some three years ago, the Corporation has carried on an extensive and far-reaching program of expansion and modernization. The greatly enlarged mill was formally put into complete operation on November 21. Present in Gadsden for the occasion were R. J. Wysor, Republic president, and C. M. White, vice president in charge of operations. They were honored at a luncheon by the Gadsden Chamber of Commerce.

Electric Brooder Manufacturer Will Open Eastern Branch

The Lyon Rural Electrical Company has begun construction at Greensboro, North Carolina, of a plant which will serve as its eastern distribution point, office and demonstration ground. The Greensboro office of the firm, which deals in electric brooders and modern electric poultry equipment, will serve the area east of the Mississippi. C. J. Bales, of Los Angeles, will be in charge of the new office.

Bussman Celebrates 25th Anniversary

Celebrating the 25th anniversary of the company's founding, officers and employees of the Bussman Manufacturing Company, St. Louis, gathered recently for a commemorating dinner at the Coronado Hotel in St. Louis. Featured speaker at the meeting was W. L. Hemingway, chairman of the board, St. Louis Chamber of Commerce.

The 25th anniversary of the company was further commemorated by a booklet distributed to all employees at the dinner which described in a graphic manner the twenty-five years of progress in fuses pioneered by Bussman Manufacturing Company.

The large number of employees in attendance at the dinner gave emphasis to the considerable growth of the company since its organization twenty-five years ago. At that time

it consisted of the officers and four employees. Today, it includes more than 165 employees of more than ten years' service, and nearly 250 who have been identified with the company for more than five years.

Among the veterans of the organization are W. F. Watkins, district manager, Atlanta, who has been associated with the Bussman Company since October, 1919. J. B. Booth, district manager, Richmond, Va., has been associated with the company since February, 1927.

News about People—

L. T. Blaisdell, commercial vice president of the General Electric Company since 1936, with headquarters in Dallas, Texas, has been named manager of the East Central district of the company, according to an announcement made by **E. O. Shreve,** vice president. At the same time, it was announced that **W. B. Clayton** will succeed Mr. Blaisdell in Dallas as manager of the Southwestern district.

L. T. Blaisdell

Mr. Blaisdell, a native of Massachusetts, has been district manager in Dallas since 1924. He entered the employ of General Electric in 1904. He was later transferred to the construction department as supervisor of power plant installation until 1911, at which time he was transferred to the Baltimore office as commercial engineer. In 1917, he was transferred to Washington as manager of that office, a position he filled until 1923 when he was sent to Dallas as manager of the Southwestern district.

W. B. Clayton

Mr. Clayton entered the test course of General Electric at the age of 17, following his graduation from Alabama Polytechnic Institute in 1905. He was soon transferred to the motor engineering department, and in 1910 he was transferred to the commercial department and subsequently was sent to Dallas, Texas. Later, he was made transformer specialist of that district, and in 1924, when the Southwestern district was formed, he was made manager of the Central Station department and assistant district manager, which position he held until now.

* * *

W. E. O'Brien, assistant sales manager, Toastmaster Products Division of McGraw Electric Company, has been appointed sales manager of the domestic appliance department according to announcement by **D. Scott Campbell,** executive vice-president.

B. M. Riker W. E. O'Brien

At the same time, it was announced that **B. M. Riker,** assistant sales manager of the commercial equipment department, had been appointed sales manager of that division.

Mr. O'Brien, formerly associated with the Aluminum Company of America, and later with Chicago Flexible Shaft Company, joined the McGraw Electric Company sales organization in 1934. He has served as assistant sales manager since 1935.

Mr. Riker has served for the past two years as assistant sales manager of the commercial equipment department. Prior to joining Toastmaster, Mr. Riker was manager of commercial and industrial sales for the Rockland Light & Power Company of Nyack, New York, and before that was active in the promotion of commercial cooking, heating and power sales for Charles H. Tenney & Co., of Boston. He has served for the last twelve years as a member of the National Commercial Electric Cooking Council.

* * *

Charles F. Strebig has been named manager of General Electric lamp department's new Nela Specialty Division, according to recent announcement. Mr. Strebig served as sales manager of the G-E Vapor Lamp Company before its recent merger with the Incandescent Lamp Department. In his new capacity, Mr. Strebig will be responsible for the promotion, among other items, of Neon glow lamps, mercury switches, and quartz mercury arcs.

Further expansion of its contacts with department and furniture stores is announced by Frigidaire Division, General Motors Sales Corporation, with the appointment of **L. C. Truesdell,** who will be assigned to nationwide activity in connection with development of department store dealers, and the appointment of **R. E. Krumm,** who has been appointed to the dealer development department to contact furniture stores on a countrywide basis.

R. E. Krum L. C. Truesdell

Previous to his appointment to this new position, Mr. Truesdell was sales manager of Frigidaire's Kansas City office. Mr. Krumm was formerly associated with the National Retail Furniture Association, in Chicago, where he was successively director of research, secretary of the controller's division, and later business manager of the association's publication, the National Furniture Review.

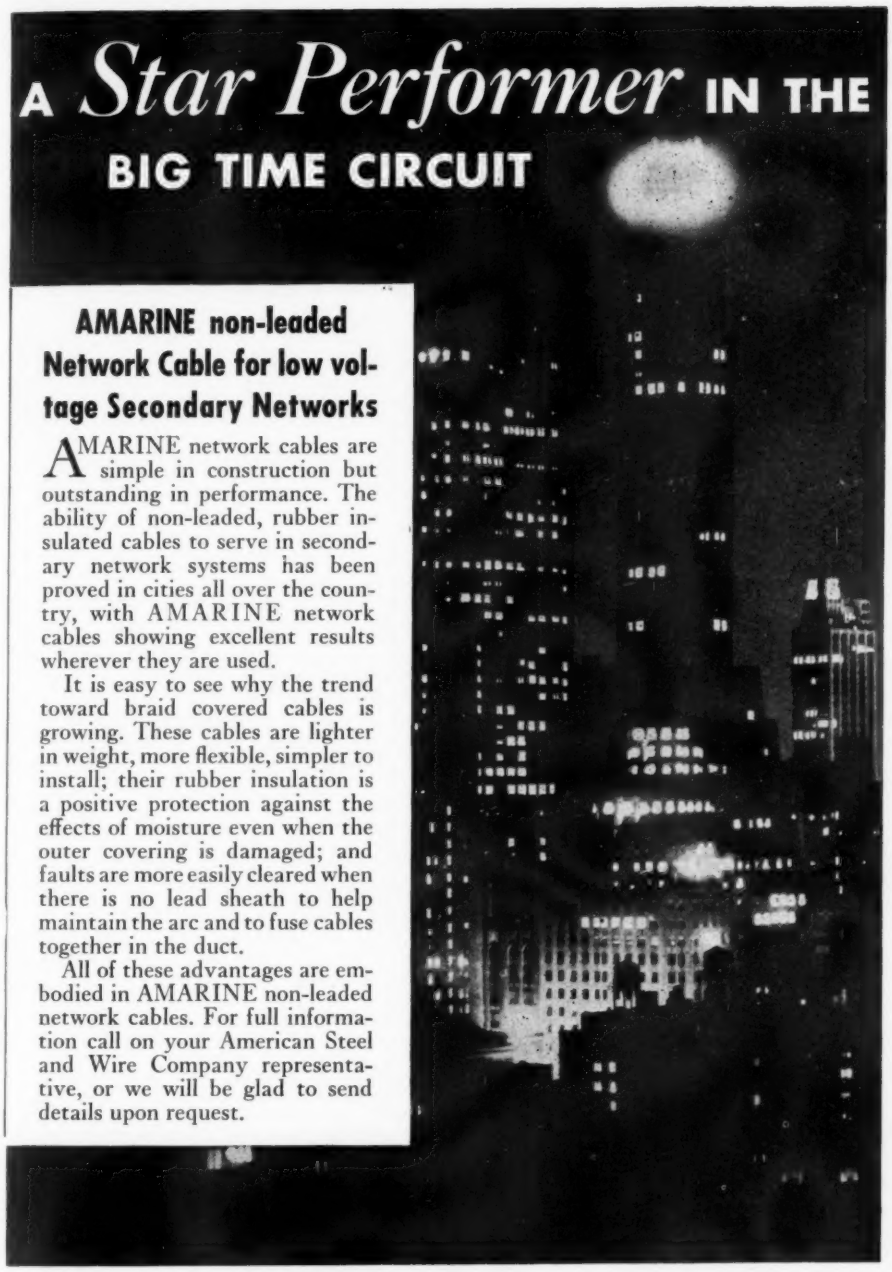
* * *

Appointment of **W. W. Grant** as director of marketing research for the merchandising division of the Westinghouse Electric & Manufacturing Company, Mansfield, Ohio, is announced by **Frank R. Kohnstamm,** sales manager of the division. Mr. Grant will devote his attention not only to market analysis but to the study of marketing methods, distribution problems, consumer preferences, and sales research problems. He was formerly market analyst in the Westinghouse new products division.

* * *

Sam C. Mitchell has been appointed manager in charge of southern division operations of the Hurley Machine Division, of Electric Household Utilities Corp., manufacturers of Thor washers and ironers. His headquarters will be established at Memphis, Tenn., where he will supervise the southern territory comprising Al-

A *Star Performer* IN THE BIG TIME CIRCUIT

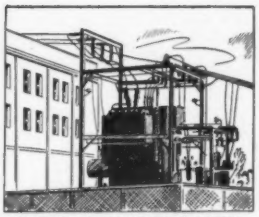


AMARINE non-leaded Network Cable for low voltage Secondary Networks

AMARINE network cables are simple in construction but outstanding in performance. The ability of non-leaded, rubber insulated cables to serve in secondary network systems has been proved in cities all over the country, with AMARINE network cables showing excellent results wherever they are used.

It is easy to see why the trend toward braid covered cables is growing. These cables are lighter in weight, more flexible, simpler to install; their rubber insulation is a positive protection against the effects of moisture even when the outer covering is damaged; and faults are more easily cleared when there is no lead sheath to help maintain the arc and to fuse cables together in the duct.

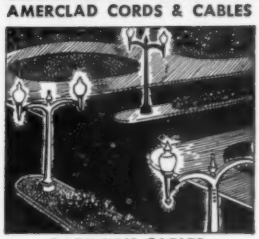
All of these advantages are embodied in AMARINE non-leaded network cables. For full information call on your American Steel and Wire Company representative, or we will be glad to send details upon request.



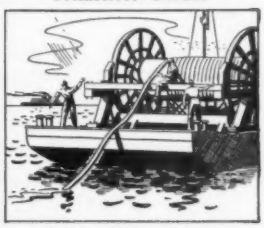
PAPER INSULATED CABLES

VARNISHED CAMBRIC CABLES

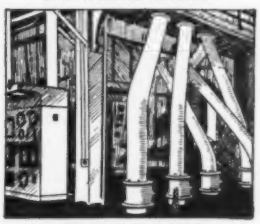
AMERCLAD CORDS & CABLES



PARKWAY CABLES

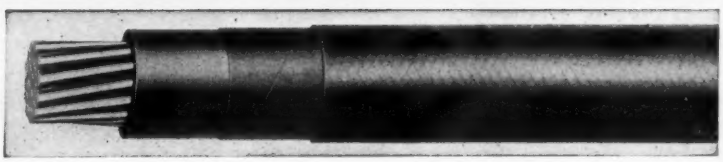


SUBMARINE CABLES



AMERBESTOS CABLES

ADEQUATE WIRING SERVES AND SAVES



AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

abama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, Tennessee and Texas. Mr. Mitchell was formerly with the Nash-Kelvinator Corp. of Detroit, Mich., where he served as a sales and merchandising executive.

* * *

The appointment of **A. L. McCarthy** as manager of branch and resale operations has been announced by **J. S. Sayre**, vice president in charge of sales, Bendix Home Appliances, Inc. Mr. McCarthy is well known for his work of creating and building national man power organizations with sales training of a specialized character. He was formerly vice president in charge of sales for Eureka since 1919 and had been associated with that company since 1914.

Frigidaire Extends Line

With the introduction of two models of combination electric ranges and kitchen heaters, Frigidaire Division, General Motors Sales Corporation, adds additional ranges to the line with which it made an initial entrance into the cooking field two years ago.

One of the combined electric range and kitchen heater units will be known as model BC-5 and is designed for use with wood, soft coal and other hard fuels. The second unit, model BC-6, will burn only anthracite coal. Water backs and water

coils are available for both models.

The new models include a one piece cooking top and all-porcelain cabinet. The 4700 watt oven is identical in size with that of the standard Frigidaire electric range oven. Twin heating unit consists of a bottom unit of 2000 watts and a top unit of 2700 watts.

Surface cooking equipment includes one 8" 700-watt unit, one 8" 1200-watt unit, and two 6" 1200-watt units, each having five cooking speeds.

Automatic Coffee Maker

A completely automatic glass coffee maker, built to sell at only $7.95, is announced by The Silex Company, Hartford, Conn. With the new automatic model Silex Glass Coffee Maker, the operator has only to "set it and forget it." When the water

rises to the upper bowl, the current is turned off automatically. When the brewed coffee has returned to the lower bowl, "Anyheet control" takes over and keeps the brewed coffee at drinking temperature indefinitely.

In addition to the Delray automatic model, shown here, there is a Lido, Catalina, and a Pinehurst completely automatic Silex Glass Coffee Maker. There is also available an automatic attachment which converts any recent model Silex Glass Coffee Maker into an entirely automatic unit. The attachment lists at $2.95.

Empire Presser-Iron

A new de luxe Empire electric presser-iron is announced by the Empire Electric Company, Cincinnati, Ohio. This new presser-iron, only as large as your hand, and weighing ten ounces, has a wide range of uses at home, office, traveling, etc. Its

unique construction makes it possible to use it either as a presser for coat sleeves, pants, ties, etc., or as a flat electric iron when the handle is folded back in position.

Packed in attractive packages, the iron is priced at $2.50 complete with 6 ft. detachable cord.

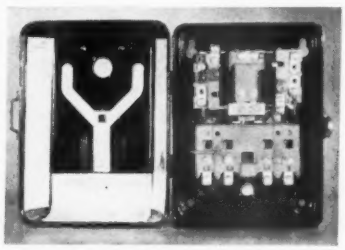
Proctor Never-Lift Iron

Enthusiastic public acceptance is reported by the Proctor Electric Company, Philadelphia, for their new Never-Lift iron, as a result of two test campaigns. The principal feature of the Proctor Never-Lift iron is the elimination of lifting and tilting in its operation. Pressing a button on the handle releases the stand and the iron raises itself. Pressing the heel of the handle allows the stand to click back into place.

In addition to this special feature, the Proctor Never-Lift iron is covered by a three-year guarantee. Another feature is a dial of fabrics and temperature control for slow and fast ironers.

Small Westinghouse Line Starter

A new small and inexpensive across-the-line starter for ratings up to two horsepower, 220, 440 and 550 volts, two- and three-phase and equivalent ratings on single phase, is announced by the Westinghouse Electric & Mfg. Company. They are used for across-the-line starting of squirrel-cage induction motors and as primary switches for wound-rotor in-



duction motors. Principal features include De-ion arc quenching and snap action bi-metal disc overload relay. This smaller unit employs the same line of heaters as the larger linestarter which it supplements and as the De-ion motor watchman manual starters. Typical applications include machine tools, conveyors and pumps.

Benjamin Fluorescent Fixture

A new porcelain enamel single reflector type twin-lamp unit designed particularly to make available the advantages of fluorescent lighting to general overhead illumination of industrial interiors, has been announced by the Benjamin Electric Manufac-

turing Company, Des Plaines, Illinois. The new Benjamin "Stream-Liter" fluorescent lamp, illustrated here, utilizes the new 48-inch, 40-watt lamp. The units have a widespread distribution of light comparable to the dome-type incandescent lamp reflectors but the deep shade provides adequate shielding against glare.

Lamps, sockets, thermal glow-switch type starters, and line ballast equipment for regulating current to

the lamps are all attached to the reflector which is hinged to the upper housing of the fixture for greater accessibility. Suspension is by means of a chandelier chain to hooks provided on top of housing or by rigid conduit secured through knock-outs in housing by locknuts.

Tulamp type ballast units are used in these fixtures improving the power factor of each fixture to approximate unity and greatly reducing any possible stroboscopic effect.

Trumbull Multi-Breaker

The new type MO multi-breakers are now being manufactured by the Trumbull Electric Mfg. Company, Plainville, Conn. These new units, available in 15, 20 and 25 ampere capacities, give low-priced short circuit and overload protection to motor, lighting and high wattage appliance circuits.

In addition to being low in price and easy to wire, they are particularly compact in size, their dimensions being 3-13/16" x 5-7/8" x 2-3/16". They are furnished for either flush or surface mounting and can be provided with insulated grounded or no neutral. All units are calibrated and sealed at the factory.

Ideal Industrial Cleaner

The line of portable hand-type and portable tank type industrial cleaners manufactured by the Ideal Commutator Dresser Company, Sycamore, Ill., is now being furnished with new improvements which include a three-wire ground cable and protective mesh wire screening of motor commutator housing.

The new three-wire cable which is permanently attached to the blower handle, uses the third wire as a ground on the handle casing to protect the operator from shorting shocks caused by weather, excessive moisture, oil accumulation and accidental contact with live parts.

Plug-In Angle Socket

The National Electric Products Corporation, of Pittsburgh, have recently added to their plug-in strip line a new No. 971-1 angle socket, which makes plug-in strip a most flexible means of providing lighting arrangements. Lumiline, tubular and standard shaped lamps may be interchangeably used and lighting arrangements changed at will. The socket will accommodate standard lamps from 15 to 100 watts, inclusive.

Plain Hoss Sense
+ good basic quality
+ up-to-date design
= SUPERIOR
REG. U.S. PAT. OFF.
★ ★ PRODUCTS
THE SUPERIOR SWITCHBOARD & DEVICES CO.
CANTON, OHIO
★ Manufacturing ★
METER & RELAY TEST SWITCHES
METER & TRANSFORMER ENCLOSURES
METER TEST BLOCKS & TABLES

Southwestern IES Meets in Austin

(*Continued from page 33*)

Company. His talk was of a rather technical nature and was of special interest to the students of architecture who were present.

A feature of this meeting not on the program was the presentation by C. A. Patterson, I. E. S. member from Oklahoma, to the University of Texas of a small box containing a stubby little lead pencil used by his grandfather and others in preparing the first educational laws of the State of Texas. This memento of an early era was accepted for the University by its president, Dr. Homer P. Rainey.

Servicing the "Low Side" Of Refrigeration Systems

(*Continued from page 25*)

tion, I believe, and most engineers are recommending, that the coils be operated dry with the expansion valve installed at the top of the coil. This eliminates the excess refrigerant that might be floating in the coil when the compressor is on the off cycle, which is thus beyond the control of the expansion valve.

Until recently, it has been considered good practice, when making a coil installation, to fasten the control bulb of the thermostatic expansion valve on the suction line just after it leaves the coil and just before passing through the refrigeration compartment wall. Although this type of installation results in minimum line losses between the coil and the condensing unit, it may result in expansion valve and coil troubles.

The difficulty with this type of installation lies in the fact that higher temperature from the outside may transfer enough heat through the short length of the suction line to affect the control bulb after the machine has operated through a cycle and shut down. The heat transmitted by the suction line soon causes the control bulb to open the expansion valve with the result that the coil will load up on the off cycle. When the compressor starts, the suction line will frost and raw liquid may

reach the compressor and cause it to "slug." This type of installation is shown in Figure "A" in the accompanying diagram.

A very simple remedy for this trouble is to add a few feet of tubing to the suction line in the form of a loop between the control bulb and the point where the tubing goes through the compartment wall. Such an installation is shown in Figure "B" in the accompanying diagram. Another remedy is shown in Figure "C." In this case, the thermostatic expansion valve control bulb is fastened to one of the return bends above the tail end of the coil. This method would be desirable only when too much coil surface has been provided.

Similar difficulties sometimes are experienced in the case of water bath jobs. Here again, if the control bulb is fastened on the tubing above the water level, a quick heat transfer from the warm tubing may cause improper operation. The best method would be to place the bulb deep down in the bath near the last turn of tubing on the coil.

Bottle coolers for keeping bottle drinks cold frequently present a problem of this nature when using a water bath because of the wide differential in temperature between the top and bottom of the bath.

One reason for this may be that the baths are operating at temperatures where the water stratofies and does not follow the usual circulation principal. Some service engineers fail to take into consideration the fact that cold water circulates up instead of down after it reaches a temperature of 39 degrees F.

With this fact in mind, and if the temperature of the bath is running below 39 degrees, it appears to be better practice to bring the refrigerant in at the bottom of the coil and let it flow upward. This may result in the formation of a cake of ice around the bottom of the coil but to limit this, the suction tubing leaving the top of the coil may be returned in a loop to the bottom of the bath. The expansion valve control bulb may be fastened to the suction line at the bottom of the loop so that ice forming at that point will affect the bulb. An installation of this type is illustrated in one of the accompanying diagrams.

The coil and expansion valve should ordinarily be the most trouble free part of a refrigeration system, but a slight misapplication or a little error in design can make them very troublesome. When a stubborn service job is encountered which requires repeated changes in expansion valves, consider the installation in the light of the experience presented here—you may find the solution to some of your most exasperating problems.

Connecting Diagrams for Lap Wound A-c Motors

(*Continued from page* 27)

wise. The third phase is started on a group 1 and 3 away from the "A" phase and the 1 and 4 groups picked up in the same rotation as the other phases.

The next check is the "direct current magnetic polarity" method and the star type of connection will be considered first as with this type of connection the winding can be tested without breaking any internal connection.

Connect one d-c test lead to the common star connection and with parallel star connections make sure that all star points are connected together. The remaining d-c test lead is connected to the "A," "B" and "C" phase leads in succession. With the d-c lead on the "A" phase line lead, use a compass and mark the groups "N" and "S" as the compass needle indicates. Remember that the north end of the compass needle will point to a south pole on the stator coil.

Next move the d-c test lead to the "B" phase line lead without disturbing the d-c lead at the star connection. Use the compass again and mark the core. It is well to use different color chalk or locate each phase markings at a different point, that is, phase "A" near one end of the core, then all "B" phase markings nearer the center, and all "C" phase markings near the opposite end of the core. Thus the markings can be checked together or as a single phase.

If the winding is correct, the markings made by the compass will alternate "N," "S," "N," "S," etc., on all pole phase groups. If there are two groups marked "N" or "S" together at any one or more points, the winding should be given the mechanical check to locate the error.

With the delta connections, one junction of phase leads must be opened, that is, disconnect all "A" phase leads from the "C" phase leads, but maintain connection between all the "A" phase leads and between the individual "C" phase leads. Then mark one d-c test lead and apply it to the opened lead and the other to one point of the delta. Use the compass to mark the core as described above. Then move the marked d-c lead to the point where the unmarked d-c lead was connected and move this d-c unmarked lead to another point of the delta. Mark the core with the compass as before, and then check the third phase by moving the d-c test leads again as described above. Care must be taken to apply the d-c test leads so as to provide the same directional current flow in each phase to be tested.

Thus the "all in" current flow as indicated by the directional arrows can be employed for both the mechanical and d-c magnetic polarity test. For correct windings, the arrows or polarity, should alternate on adjacent pole phase groups.

The next article will present the six-pole, three- and six-parallel connections, arranged for single and dual voltage, and will discuss the differences between short and long jumper connections.

Network System Operation Studied

(*Continued from page* 22)

allowable voltage variation. The trend toward this objective voltage range is contrary to that experienced as reported in the 1935 Report.

The performance of network protectors under fault conditions requiring the clearing of defective primary equipment at the secondary side of the network transformer has improved 25.2% over the record for the previous report. Excluding those failures not directly chargeable to the protector, this failure record is the best shown in any of the preceding seven years.

Assuming the present secondary major fault record or rate to be typical, the expectancy or rate of occurrence of major faults on the secondary grid is approximately one major fault per 100 miles of equivalent 3/c and neutral secondary cable every two years. At the present failure rate for equivalent three-phase network transformer banks, the expectancy rate

for failures is approximately one failure in each 100 equivalent three-phase transformer banks every two years. Approximately 93% of all complete network outages for the last seven years are occasioned by failure of the source of power to the network primary feeders.

The conclusions reached and the tabulated data presented in this report should be accepted with the realization that it is extremely difficult to select a method whereby the trends could be presented where the data of a large number of small units would not overshadow the performance of a small number of large units. Conversely, when compared on a basis of size, the reverse condition would be true. Realizing that a weighting factor would be greatly influenced by individual opinions and experience, the conclusions reached in the report may not necessarily present a correct picture when a comparison to an individual network is made.

New Instrument for Power Factor Surveys

(*Continued from page* 23)

knob on the end of the tube is adjusted until the light beam index shifts from one point to another. The scale is then read and the actual vars, volts, or amperes determined by reference to curves supplied with each set of voltage dividers.

Understanding and Using The Electrical Code

(*Continued from page* 16)

In the previous discussion of feeders; it will be remembered that the main feeder load for the residence shown in Figure 14 (See September 1939 issue) was 17 amperes. A No. 12 two-wire feeder would be sufficient for this load. However, section 2305c states that a No. 8 is the smallest service entrance conductor that may be used on any installation having two or more branch circuits. The main feeders, or service entrance conductors in this case, must be two No. 8 and not No. 12 as shown by the feeder calculations.

Quite often a property under single management may consist of several buildings. Each of these buildings must have a separate control, such as a circuit breaker or externally-operable switch, and must have its wiring properly protected by the circuit breaker or fuses. The protection and control do not necessarily have to be in the same building. For example, a garage may be served as an extension to one of the branch circuits in a house. The protection is offered to this circuit by the branch circuit breaker or fuse located in the house. The control must be a separate switch which may be located within the garage, at some convenient point in the house, or a three-point control at both locations. Section 2306 states all the requirements for such master services.

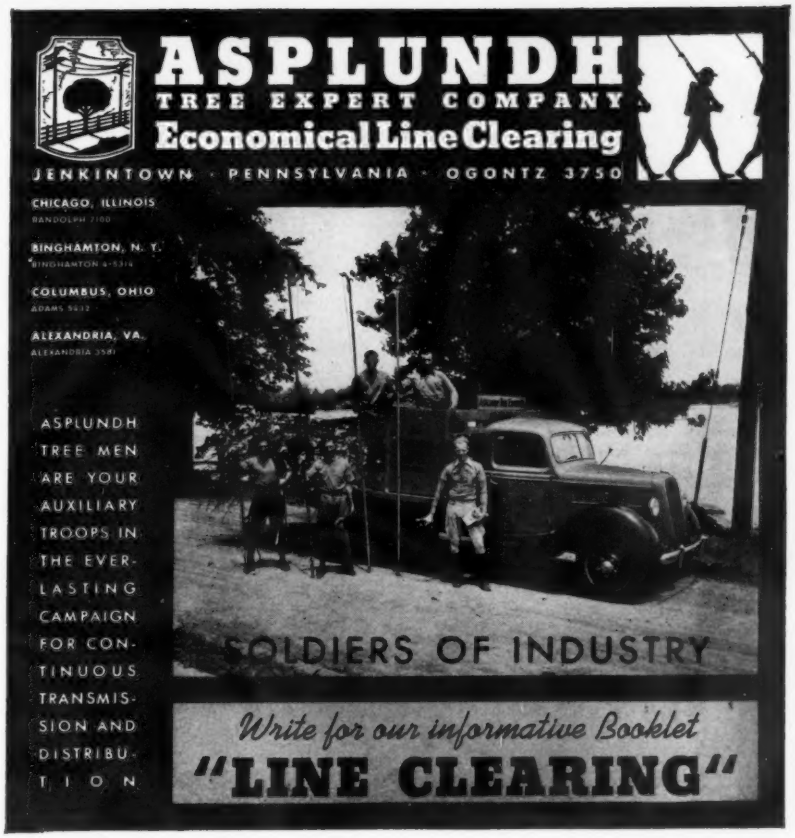
Section 2307 sets up the exceptions to the rule which requires the service entrance conductors to be without splices. Since the approval of the meter-switch fuse sequence of service entrance equipment, the code must make an exception to the splices made in these conductors in the installation of the meter base ahead of the service switch. Section 2307a recognizes this exception.

Furthermore, since taps are allowed to a service drop and also to main service entrance conductors as shown by Figures 21 and 22, a second exception must be recognized for these splices. Section 2307b states this exception.

Finally, section 2307c allows lead covered cable to be terminated in a junction box where the cable enters a building, provided that the extension from this terminal box to the service switch or meter is made with some other form of cable.

An additional exception has been recommended for the 1940 code. In the standardization work being done by many utilities, meters are being moved from indoor locations to outdoor positions. Very often the new meter will be placed at quite some distance from the old service entrance conductors. The new exception would recognize the splicing in of the new meter loop into these existing service entrance conductors. This practice has become routine for most utilities and the adoption of this revision will but recognize an established procedure.

Section 2308 prohibits the installation of other than service wiring in a service raceway. One exception is recognized. The con-



Greenlee TOOLS

TIMESAVERS and PROFIT-MAKERS FOR THE CONTRACTOR

Conduit Benders

Greenlee Hydraulic Conduit and Pipe Benders are timesavers, because they bend faster than by other hand methods. In addition, they make smooth, even bends, making it easy to pull in wire and cable.

Knockout Tools

Greenlee Punches and Cutters make it easy to enlarge holes in switch boxes, cabinets etc. They form clean-cut holes quickly and accurately, without reaming or filing.

Our new Catalog, No. 31E, illustrates and describes these tools, as well as many others of interest. If you do not have a copy, send for one now.

GREENLEE TOOL CO.
1707 Columbia Ave.
ROCKFORD ILLINOIS

GREENLEE TOOL CO., 1707 Columbia Ave.
Rockford, Illinois

Would like information on _____

_____

☐ Please send a copy of Catalog No. 31E.

Name _____

Street _____

City and State _____

My jobber is _____ ES-12-39

ductors of a circuit controlled by a time switch may be installed with these service entrance conductors.

Christmas Appliance Merchandising Plan

(*Continued from page* 8)

"Awards were based on neatness and force of presentation, according to the age and grade of the contestants, so that the young students had equally as good a chance as the older ones. All the students had to come to the office of the company to obtain their entry blank and reference material on better lighting, and all were urged to note the illuminating displays, both in the large sales room and in the windows.

"Booths were fitted up showing poor, average, and good lighting, and the boys and girls were asked to notice under which class of light they were working at home or in school. The youngsters were quick to catch the point, and to take up with their parents the question of better lighting, for by far the majority were working under only 'average' conditions. Many of them brought dad and mother to see the lighting exhibit, with the result that there was an unprecedented call for modern lamps for holiday gifts—especially lamps for the students' room or den."

Plant Surveys Promote Rewiring Sales

(*Continued from page* 11)

lighting system. Mr. Hansberger, himself, has developed another device which has proved most valuable in demonstrating the effect of low voltage on light and power efficiency.

Anywhere from one to four days may be used in completing a survey, which, as a promotional item, costs the company from $10 to $40 in time and equipment. The solicitors receive around $40 per week and commissions on business they obtain. All of them are full time employees in this capacity.

Having found the service heartily appreciated by plant operators, and that it pulled its weight as a business-getter, the firm is advertising it as well as offering it through its solicitors. They have made use of frequent newspaper insertions featuring the service, and have plugged it in direct mail sent to all industrial power users in the Nashville area.

Frequently a dual benefit has accrued to the power consumer through the company's survey. At a check-up in the plant of the Jamison Anchor Springs & Bedding Company, the very first step in the survey revealed that the voltage at the service entrance was unusually low. Further investigation showed that the power company's transformer, through which the plant was supplied, was overloaded. After the attention of the utility was directed to this condition, the transformer was promptly replaced, and the Electrical Construction Company earned the thanks of both utility and consumer, since the Jamison plant, according to its general manager, found the efficiency of its equipment greatly increased through the transformer replacement. He was disposed, accordingly, to authorize a complete survey of the entire plant and all machinery, with the result that a contract for considerable new wiring was secured by the progressive contractor.

THE MATERIALS OF GOOD LIVING
ARE BROUGHT TO A FOCUS HERE
Mayfair
ST. LOUIS
LOCATION • COMFORT
FINE FOOD • COURTESY
Over 50% of all rooms $3.50 or less, single; $5.00 or less, double

YOUR PASSPORT to CONVENIENCE COMFORT COURTESY

Over 50% of all rooms $3.50 or less, single; $5.00 or less, double

How to Close More Water Heater Sales

(*Continued from page 7*)

weed out the "suspects" is obvious.

However, this latter group is not entirely worthless, because once a name is mentioned to me, a file is made immediately upon that name and retained until sale is made or lost to competition as the buying ability of the individual changes constantly. The credit rating of each name is checked by me personally as soon as possible and it is upon this information tnat my judgment is based as to his buying ability.

Securing an interview comprises the next or third step. Upon completion of details outlined in the preceding paragraph, and having satisfied myself as to the individual's purchasing power, I proceed to obtain an appointment at my customer's convenience. The latter point is most important because by making the interview at his convenience, I secure his undivided attention, thus making my presentation a more potent one. Brevity is desirable at all times, and through experience I have succeeded in condensing my talking points to a minimum. After awakening his interest in the unit, I present my literature in an intelligent, comprehensible manner, leaving it with him to emphasize my sales story.

A survey of his electrical hot water needs goes to make up the following or fourth step. This survey consists of several direct questions pertaining to the number in his family, the uses to which hot water is now being put, the location of the water dispensors, the condition of the basement, if any, and any other questions suggested by his individual case. The information secured through these inquiries is used in determining the size of the water heater I shall recommend and whether the installation will be a normal or abnormal one.

The fifth or final step is the seizure of the proper psychological moment in which to secure his signature on the order blank. Intuition alone is your only guide in this, as each sale is vastly different, due to the fact that no two people are to be handled identically.

The five points as outlined above have proven most helpful in my sales of electric water heaters, and have been totally responsible for the number I have succeeded in delivering in my territory.

Training and Discipline In a Sales Organization

(*Continued from page 6*)

(7) Full net commissions and quota credit go to the man who closes a sale in an unassigned territory.

(8) The difference between the gross and net profit commission is represented by salesman's concessions to customers and is shared by the participating salesmen in the deal in proportion to their respective share of the commission.

(9) Where a concession to a customer represents a trade-in item of value, that item belongs to the salesman who paid for it. It will be brought to the store if instructions on the dray ticket so indicate.

Couch TELEPHONES TRADE MARK

SERVING the SOUTH

PRIVATE TELEPHONES

FIRE ALARM SYSTEMS

APARTMENT HOUSE PHONES & MAIL BOXES

ANNUNCIATORS—BELLS—CABLES

SPECIAL SIGNALING SYSTEMS

CODE CALL SYSTEMS — Blake STAPLES

S. H. COUCH COMPANY, Inc., North Quincy, Mass.

— Established 1894 —

— DISTRICT SALES OFFICES —

ATLANTA—William E. Hopper, 357-9 Marietta Street
DALLAS—Ernest L. Wilks—7935 Eustis Street
LOUISVILLE—C. C. Baines—4107 River Park Drive
NEW ORLEANS—Lyman C. Reed—811 St. Charles Street
OKLAHOMA CITY—W. C. Bilyeu—3005 North Hudson
RICHMOND—L. W. Roberts—111 North Eighth Street
TAMPA—Ernest D. Gruppe—5505 Central Avenue

(10) Trade-in items will be warehoused for the salesman in limited quantities and for a limited time to help him get his money out of them. Any charge for extra drayage or repairs is done for the salesman's account.

(11) Senior salesmen are granted floor time on a rotating basis, one-half day at a time, provided they have realized at least 50% of their previous week's quota.

(12) Each salesman must phone the department every morning before noon.

(13) The prospect register file is in Mr. Uhalt's care. When entering a prospect in the register, the salesman must fill in two cards accurately, one for the file and one for his own use.

(14) Saturday's time, as well as Sunday, belongs to the salesman unless a meeting is called.

(15) Five days a week the salesman must be in his territory by 8:30 in the morning. The afternoon hours are his own, after the daily sales meeting or training school.

The training school, held at the store five days a week, from one to three o'clock, is of primary importance. It is there that Mr. Uhalt has the opportunity of instilling some of his own knowledge, his sales ability and enthusiasm into his men. Each salesman must be present at the school after which he can follow up leads and direct his work largely according to his own choice.

Mr. Uhalt, who believes in "double-fisted, top-sergeant leadership —no tricks and no panacea," has had a most interesting electrical career. It began at age 9 with a wireless set. Later, he worked for the British Thomson Houston Co., Ltd., as junior engineer in various parts of Europe and Africa.

He came back to the United States in 1926. As a utility engineer, he was engaged in construction of power plants, distribution systems, transmission lines, etc. Attracted by appliance merchandising opportunities, he served with Mississippi Power & Light Co. as salesman; then became General Electric dealer in Monroe, La.

After establishing a splendid sales record as a dealer, he became associated with General Electric Company and served both in New York and in New Orleans. He was at Nela Park for over six years, and while serving as manager of the G-E dealer division, worked out a successful merchandising plan for dealers.

Mutual Understanding and Cooperation

Manufacturer . . .

(*Continued from page* 3)

things, but when once the germ is planted, it must, of necessity, gradually make progressive headway and ultimately represent a continuing effort.

Looking a little further, it is my belief that eventually these cooperative pools, now spotted around the country, will widen in their influence until they merge. Then we shall have complete unity of effort from which all will benefit to the extent that they take advantage of a comparatively new and important phase of our business structure.

Utility . . .

(*Continued from page* 2)

lating equipment compete keenly with one another. They are compelled by this competition to endeavor to produce apparatus more dependable or more economical than others engaged in the same busines. This has led them to constant research on and improvement in the equipment they make available to the utility companies. This competitive urge is what has brought down in the past 20 years the pounds of coal required to produce a kilowatt-hour from 3.3 to 1.41 which represents an increase in efficiency of about 60 per cent. The part this has played in the steady reduction of rates throughout the history of the electric utility business is too obvious to mention . . .

Utilities Face Competition

For our manufacturing friends it should be pointed out that the electric utilities themselves face very real competition in their sales. The well recognized monopoly feature of the utilities has reference principally to the avoidance of needless duplication of investment, a monopoly definitely in the public interest. Beyond this point prob-

"I'm at hotel Mayfair"
CENTER OF ST. LOUIS BUSINESS
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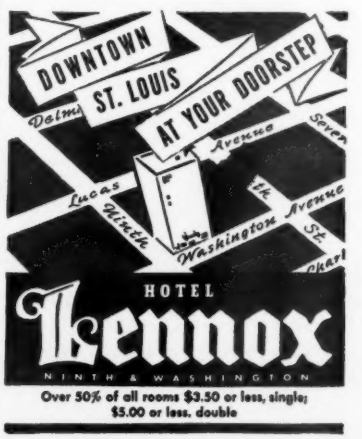
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ably over one-half of the electric utility business is won and held in direct competition with the gas man, the ice man and private manufacture of power.

Having in mind that a chain is no stronger than its weakest link, the next thought that impresses one is the necessity of the closest cooperation between these many activities and interests. This is true not only with respect to the necessary function each performs, but in the way these react on one another. Any difficulty with generating equipment would at once react on sales and effect not only the utility but the manufacturer of consuming equipment. An improvement in price or efficiency in some consuming device starts in motion a whole series of reactions, increased sales making possible rate reductions which in turn stimulate still further use of electricity, and so on back to the manufacturer of generating equipment whose business is stimulated by the greater use. . .

The close interrelationship of these various business activities has been appreciated more and more with the passage of the years and has produced corresponding cooperation among the several interests involved. Although independent financially one from the other, there are many ways they have found to help each other in the broad task of electrifying America.

We find the utilities spending an aggregate of $75,000,000 a year for developing increased sales of energy. These increased sales were obviously easier to effect, the cheaper the consuming apparatus could be purchased, and the first effect of this realization, twenty years ago, was for the utility companies not only to enter actively into the retail sale of consuming devices, but to sell them at wholesale cost or less. It soon appeared that this plan would stagnate the normal growth of retail outlets for such equipment and by their elimination the utilities would be deprived of thousands of active dealers who could be of immense help in making sales. As a result of a more cooperative and more enlightened attitude gradually adopted by the utilities, we find that in 1938, and for five to six years past, only 15 per cent of the current consuming equipment was sold by utilities and the remaining 85 per cent by retail dealers . . .

For many years however there is one important link in this long chain which has yielded more slowly to similar improvement or development. I refer to electric wiring.

There is no gainsaying that the high cost of electric wiring has long been an obstacle to the sale of electric appliances and of electric energy. The effect has been partly to prevent sales, and partly to cause wiring circuits to be overloaded to the point either of reduced safety or poor voltage at the point of use. The economic pressure to sell the heavier use household appliances has however gradually operated to produce advances in wiring materials and in the art of wiring, which, so far as they go, now make it possible to remedy this situation. The difficulty has been with the time involved in obtaining approval of new wiring developments and in convincing the various elements of the industry of the safety and desirability of any changes.

The electric utilities have made a number of proposals for changes in the Code to permit the adoption of carefully considered and well tested wiring developments which we are convinced from our experience, will attract our customers to buy and thus stimulate the business and profits of all branches of the electric industry. Like all the other developments in the history of our electric industry, what helps one helps all, and the adoption of these new materials and methods is certain to benefit contractors and dealers as well as the manufacturers. Unnecessarily expensive methods hold back the whole electric organism. It seems short-sighted to limit our mutual progress by rejection of newer, and more adaptable methods.

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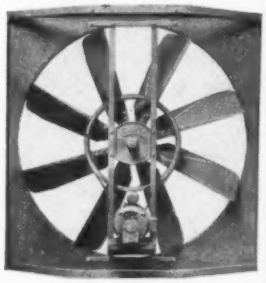

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